

Duration of phenophases of *Syringa sweginzowii* Koehne & Lingelsh. and *Syringa komarowii* C. K. Schneid. sections *Villosae* C.K.Schneid and features of their growth in the conditions of the Middle Urals

Elena Tishkina^{1,2*}, and Lydia Semkina¹

¹FGBUN Institute Botanic Garden of the Ural Branch of the Russian Academy of Sciences, 202a, st. March 8, Yekaterinburg, 620144, Russia

²Institute of Forestry and Nature Management "Ural State Forestry Engineering University", 37, Siberian Trakt, Yekaterinburg, 620100, Russia

Abstract. The article is devoted to the study of phenophases of *Syringa sweginzowii* Koehne & Lingelsh. = *Syringa tomentella* subsp. *sweginzowii* and *Syringa komarowii* C.K.Schneid. section *Villosae* C.K.Schneid in the collection of the Botanical Garden of the Ural Branch of the Russian Academy of Sciences. The patterns of growth of annual vegetative and generative shoots have been established. The average duration of growth and development of branching shoots is 133 days. Features of the mechanisms of apical growth of vegetative and generative shoots are manifested in the form of differences and similarities in seasonal dynamics. Apical growth has similar seasonal dynamics curves in shape and is characterized by synchrony in all species, which can indicate the similarity of their mechanisms in different shoots. There are specific characteristics in the growth rate of lilacs; of the two species, Zvegintsov's lilac is characterized by a high rate of apical and radial growth.

1 Introduction

Lilac is one of the most popular ornamental shrubs used in landscaping [1-5]. Recent studies prove the ever-growing interest in this highly ornamental plant [6–11]. However, when landscaping cities, 1–2 types of lilac are usually used. Therefore, in the current situation, it becomes relevant to replenish the assortment with no less decorative, unpretentious and sustainable types of lilacs.

Shaggy or hairy lilacs are the most popular plants in landscaping populated areas and, in connection with this, the duration of the growing season and flowering are very significant and important indicators.

The purpose of the study is to estimate the duration of the growing season and flowering of Zvegintsov and Komarov lilacs.

* Corresponding author: elena.mlob1@yandex.ru

2 Materials and methods

Objects are various types of lilacs of the Villosae section at the age of 9 years, growing in uniform conditions in the collection of the Botanical Garden of the Ural Branch of the Russian Academy of Sciences. The parameters of heights, projection area and volume of the crown, length of vegetative and generative shoots and diameter of second-order branching shoots were studied. The total length of vegetative and generative shoots was measured once every 6-7 days from 05/08/2023 to 09/10/2023. After growth stopped, the diameter of the shoot base was measured. Length measurements were carried out with an accuracy of 0.5 mm, and diameter measurements were carried out with an accuracy of 0.01 mm.

3 Results

Using the example of two species that differ in growth parameters, the duration of phenophases was established. Thus, *Syringa sweginzowii* Koehne & Lingelsh. at the age of seven it reached a height of 1.57 m, with a crown volume of 0.54 m³, while under uniform conditions (table) the height of *Syringa komarowii* C.K.Schneid. was only 1.07 m with a crown volume of 0.23 m³ [12].

Table 1. Characteristics of various types of lilacs from the Villosae section C.K.Schneid.

Plant parameters	Kinds	
	Lilac Zvyagintseva	Lilac Komarova
Plant height, m	0.54	0.53
Crown projection area, m ²	0.4	0.27
Crown volume, m ³	0.21	0.14
Kidney opening	May 4th	May 4th
Beginning of growth of vegetative shoots	May 4th	May 4th
Peak growth of vegetative shoots	08.05 - 14.05	08.05 - 14.05
End of growth of vegetative shoots	8 September	August 18
Beginning of growth of generative shoots	12 May	12 May
Peak growth of generative shoots	22.05 - 28.05	22.05 - 28.05
End of growth of generative shoots	August 28	8 September
Beginning of flowering	May 31	2 June
Flowering duration	31.05 - 9.06 (10 days)	2.06 - 16.06 (15 days)
Ripening of fruits and seeds	30.06 - 11.08	11.08 - 28.08
Lignification of shoots	September 15th	August 18
The beginning of leaf fall	September 18	September 15th

These species also differ in the type of apical growth of generative and vegetative shoots. After the buds open, rapid growth of vegetative shoots begins 4 days later, which lasts 18 weeks for Zveginzov's lilac, and 14 for Komarov's lilac. The growth of vegetative shoots consists of two peaks. In Komarov lilac, these peaks are equal in the 1st and 3rd weeks (Figure 1).

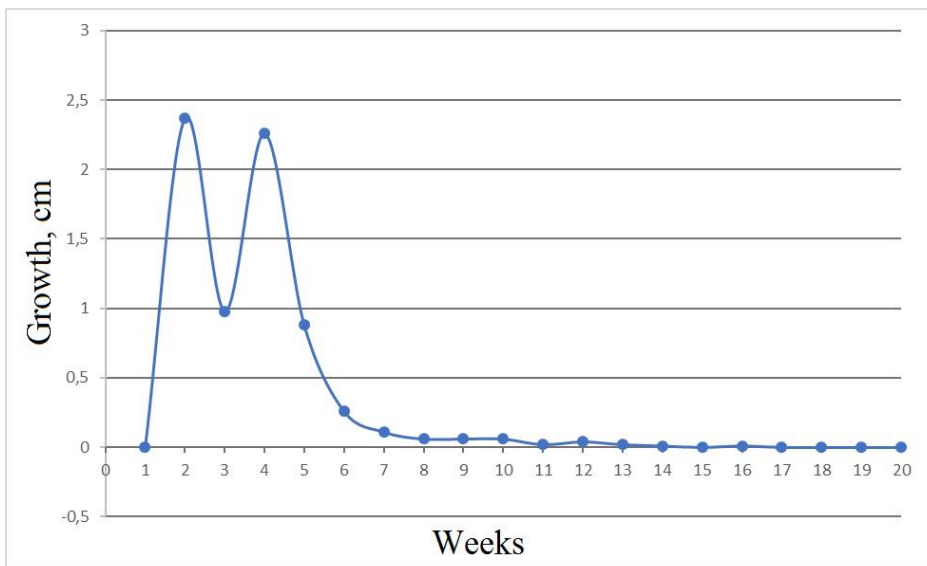


Fig. 1. Seasonal dynamics of apical growth of vegetative shoots of *Syringa komarowii*. Note: weeks: 1 (1.05.23-07.05.23), 2 (08.05.23-14.05.23), 3 (15.05-21.05), 4 (22.05-28.05.), 5 (29.05.-04.06), 6 (05.06.-11.06.), 7 (12.06.-18.06.), 8 (19.05.-25.06.), 9 (26.06.-02.07.), 10 (03.07.-09.07.), 11 (10.07.-16.07.), 12 (17.07.-23.07.), 13 (24.07.-30.07.), 14 (31.07.-06.08.), 15 (07.08.-13.08.), 16 (14.08.-20.08.), 17 (21.08.-27.08.), 18 (28.08.-03.09.), 19 (04.09.-10.09.), 20 (11.09.-17.09.).

Zvegintsov's lilac has the highest growth peak in the 1st week and a second peak in the 3rd week, coinciding with the growth peak of Komarov's lilac (Figure 2).

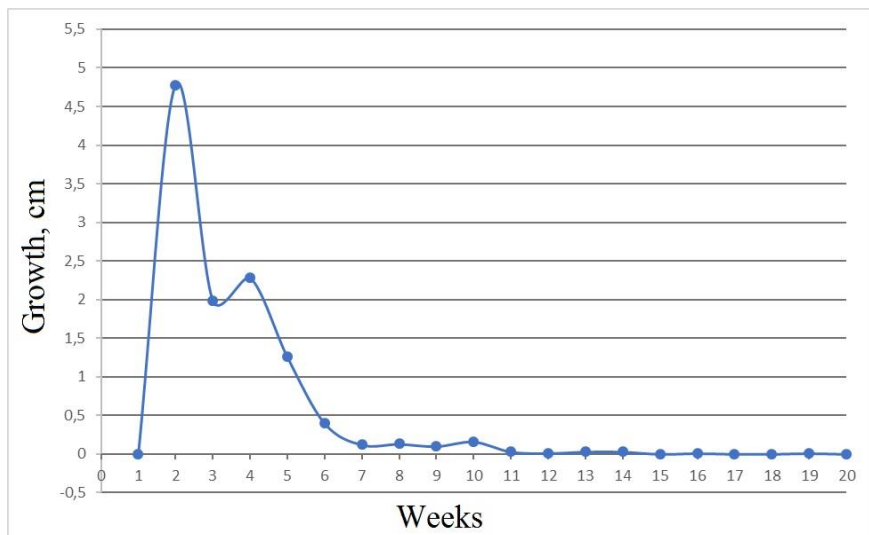


Fig. 2. Seasonal dynamics of apical growth of vegetative shoots of *Syringa sweginzowii*.

The length of the vegetative shoots of Zvegintsov's lilac exceeds the length of the shoots of Komarov's lilac, but they do not differ in diameter (Figure 3).

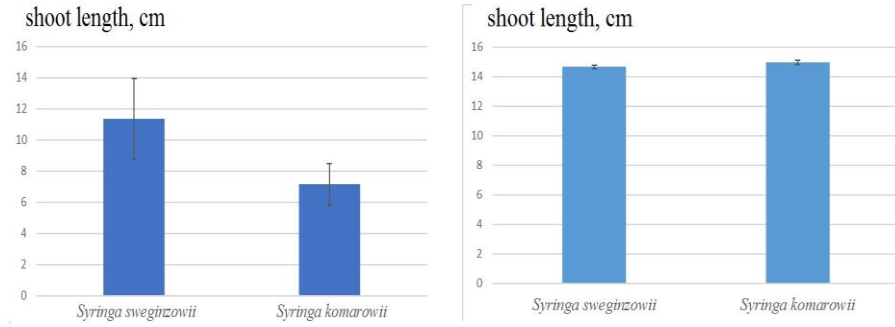


Fig. 3. Apical and radial growth of vegetative shoots of lilacs.

The growth of generative shoots is recorded after 8 days and lasts 15 weeks for Zvegintsov’s lilac, and 17 for Komarov’s lilac. Vegetative and generative growth of Zvegintsov’s lilac almost coincides (Figure 4).

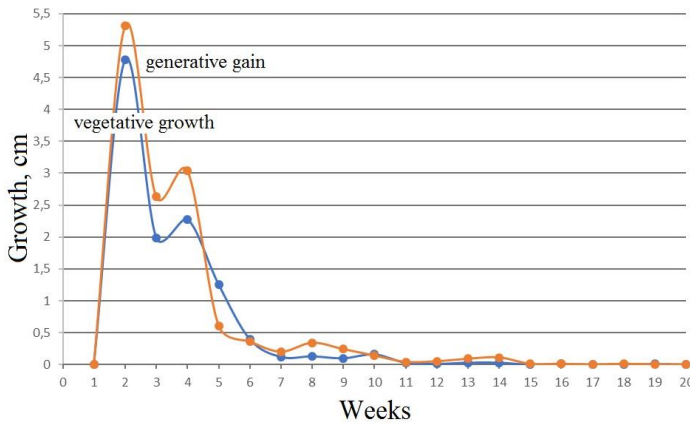


Fig. 4. Apical growth of vegetative and generative shoots of Zvegintsov's lilac.

In Komarov's lilac, the growth of generative shoots is almost 2 times higher than the growth of vegetative shoots (Figure 5).

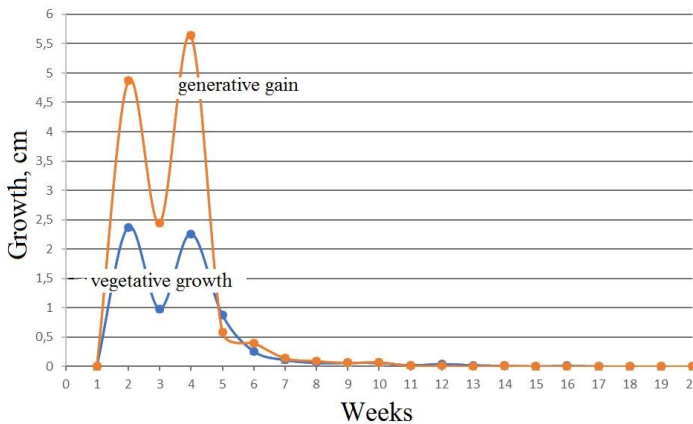


Fig. 5. Apical growth of vegetative and generative shoots of Komarov lilac.

These species bloom almost simultaneously, but the flowering time of Zvegintsov's lilac is 10 days, and Komarov's lilac is 15 days (Figure 6). The ripening of fruits and seeds is three months; for Komarov lilac it is 11 days later.



Fig. 6. Ripening of seeds in Zvegintsov's lilac.

More significant differences were revealed during the lignification of shoots, which occurred in Zvegintsov's lilac after 4.5 months, and in Komarov's lilac after 3.5 months after leafing out. The growing season for both species is 4.5 months, so in 2023 from May 4 to September 18.

4 Discussion

The growth characteristics of Zvegintsev's lilac and Komarov's lilac, of Chinese origin, are species-specific. Zvegintsov's lilac is a fast-growing species, exceeding the height of Komarov's lilac by 1.5 times. The maximum growth peak is observed in Zvegintsov's lilac - in the first week of growth. Komarov's lilac has two equivalent peaks, in the first and third week.

The growing season for both species is 4.5 months. The beginning of apical growth of vegetative shoots occurs 6 days after the leaves bloom; after 20 days, active growth of both vegetative and generative shoots begins. The growth of vegetative shoots continues for 70 days. The flowering phase begins after 28 days and lasts 10 days for Zvegintsov's lilac and 15 days for Komarov's lilac. Fruit set occurs after two months and seeds appear after 4 months. The lignification phase of shoots in Komarov's lilac begins after 3.5 months and lasts one month, in Zvegintsov's lilac after 4.5 months, towards the end of the growing season.

5 Conclusion

Comparing the two types based on the research materials, we can conclude the following:

Zvegintsova and Komarova lilacs of Chinese origin were grown under the same conditions, and the main phases were the same. Zvegintsov's lilac is a larger shrub with long, numerous shoots, a shorter flowering period, and a late and short period of lignification compared to Komarov's lilac, in which the period of lignification occurs a month earlier. Consequently, Zvegintsov's lilac is less stable. The onset of the initial and

final phases of the growing season is largely dependent on the climatic conditions of a particular year. At the same time, the role of the biological characteristics of the species at the beginning of seasonal development is insignificant, while the duration of flowering and the duration of the growing season depend on the biological characteristics of the species.

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