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FEATURES OF THE *Lonicera* L. SHOOTS GROWTH UNDER THE ABSHERON CONDITIONS

©Mammadov T., *Institute of Dendrology of Azerbaijan NAS, Baku, Azerbaijan*
©Seyidli A., *Institute of Dendrology of Azerbaijan NAS, Baku, Azerbaijan, Seyidliaysel8@mail.com*

ОСОБЕННОСТИ РОСТА ПОБЕГОВ *Lonicera* L. В УСЛОВИЯХ АПШЕРОНА

©Мамедов Т., *Институт дендрологии НАН Азербайджана, Баку, Азербайджан*
©Сейидли А., *Институт дендрологии НАН Азербайджана, Баку, Азербайджан, Seyidliaysel8@mail.com*

Abstract. The research analyzed the growth dynamics of annual shoots of some species of *Lonicera* L. in Absheron conditions. According to the seasonal dynamics of growth and development of species, *Lonicera* species are divided into 2 groups: straight and ivy species. The model species include deciduous, semi-evergreen and evergreen species, but these features of their life forms do not affect the growth process. Studies have shown that in the genus *Lonicera* L., regular growth was observed during the growing season, while in the straight species the growth was completed in July. The observed increase in hydrothermal stress had a positive effect on the growth and branching of the shoots, and an increase was observed. This growth parameter is dominated by ivy *Lonicera* L. (*L. caprifolium* and *L. etrusca*). Intensive growth was observed in Absheron in May-June and September.

Аннотация. В ходе исследования проанализирована динамика роста однолетних побегов некоторых видов *Lonicera* L. в условиях Апшерона. По сезонной динамике роста и развития виды *Lonicera* делятся на 2 группы: пряморастущие и вьющиеся. Модельные виды включают лиственные, полувечнозеленые и вечнозеленые виды, но эти особенности их жизненных форм не влияют на процесс роста. Исследования показали, что у пряморастущих видов рода *Lonicera* L. рост завершился в июле. Наблюдаемое усиление гидротермального стресса положительно сказалось на росте и ветвлении побегов, и наблюдалось его увеличение. По этому параметру роста преобладают вьющиеся виды *Lonicera* L. (*L. caprifolium* и *L. etrusca*). Интенсивный рост наблюдался на Апшероне в мае-июне и сентябре.

Keywords: formation shoots, branching shoots, growth rate, hydrothermal stress, *Lonicera* L.

Ключевые слова: формационные побеги, ветвящиеся побеги, скорость роста, гидротермальное напряжение, *Lonicera* L.

Introduction

The growth and development of a plant organism are regulated by internal and external factors under the control of the genome. Changes in the external environment affect physiological development. It should be noted that the interaction of external and internal factors is important in regulating the growth and development of the plant organism. The biological characteristics of the growth and development of plants are the main conditions that affect their reproduction and

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development. This allows us to determine an objective assessment of the ability of species to adapt at all stages of ontogenesis [1–6].

The research aimed to determine the prospects for the use of species of the *Lonicera* L. genus grown in cultural conditions in the field of experiments of the Institute of Dendrology in landscaping. Species of this genus are widely used in planting flowers, creating living fences, lawns, decorative landscaping and solitary planting. The long flowering of the species belonging to the genus *Lonicera* L., the variety of shapes (straight and branched shrubs, lianas), the color of the fruit and leaves further enhance its decorativeness. *Lonicera* L. is a good honey giver, is widely used in perfumery and some fruits of some species are edible.

The study analyzed the growth rhythm of annual shoots in the introduction of species of the *Lonicera* L. genus of different geographical origins in the conditions of Absheron.

Materials and methods

The experimental field of the Institute of Dendrology was chosen as the object of research. The geographical origin of these introducers is mainly China, Central Asia. Species are grouped according to their life forms: deciduous plain (*Lonicera tatarica* L. and *L. maackii* (Rupr.) Maxim., deciduous ivy (*L. caprifolium* L. and *L. etrusca* Santi), semi-evergreen plain and ivy (*L. fragmatissima* Lindl. et Paint, *L. henryi* Hemse.), evergreen ivy (*L. japonica* Thunb.) and evergreen straight and ivy (*L. pileata* Oliv, *L. nitida* Vills.).

The growth of shoots began in March 2020 and lasted until October. During the growing season, 10 shoots were taken from the first and second-grade branches along with the umbrella of each shrub. It was found that the height of tall straight shrubs (*L. tatarica*, *L. maackii* and *L. fragrantissima*) reaches 1.0–1.5 m. The growing intensity of the shoots was determined by the biometric method. The data obtained for the average growth of shoots (1 shovel) are reflected in the table at equal intervals. Analytical expression of the growth rate of shoots using the method of quantitative differentiation was calculated by the following formula:

$$Y=1/h\ Y(n+1) / 2Y(n-1)/2$$

Here Y is the number of days; Y (n+1) and Y (n−1) are the values of the function.

The data of the meteorological station of the Ministry of Ecology and Natural Resources were used in the research.

Analysis and discussions

In the species of the *Lonicera* L. genus studied, the shoots were classified into monopodial-sympodial types due to branching. The main branches are formed from the shoots that develop at the base of the shrub. During the growing season, 3–4-degree shoots develop on the branches, and as a result, new shoots are formed.

Seasonal growth and development of species belonging to the genus *Lonicera* L. are characterized by two groups. Studies have shown that there is a difference in the group as a result of the processes that take place in the species of straight and twisted *Lonicera* L.

During the growing season of the evergreen species, *Lonicera* L., growth and dynamic development of shoots were observed. During the study period, the growth of shoots in the liana-shaped *L. japonica* species was observed in two stages with three differences. The timing of the onset and end of the growth of the seedlings was carried out by regular measurements of the model plants, and it was found that the seedlings did not have the characteristic signs of growth limits.

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In the conditions of Absheron in 2018–2020, the vegetation period of species belonging to the genus *Lonicera* L. was long. The beginning of spring vegetation was observed in the second decade of March when the air temperature was above 14–18 °C. swelling of the buds was observed in the second decade of April. The growth of species belonging to the genus *Lonicera* L. begins with the formation of sprouts from the shoots, which are formed with the formation of shoots. In deciduous and evergreen lianas, the growth of shoots continues until the end of the physiological activity of the leaves (Table 1).

However, the growth rate varies during the growing season depending on environmental factors. The growth curves of the formed shoots increase hyperbolically, reflecting the first stage of intensification of stable growth processes.

Spring growth of ivy species of the genus *Lonicera* L. lasts until mid-May at a rate of 2.3–8.4 mm per day. The first germination of deciduous *L. caprifoliam*, *L. etrusca* species and semi-evergreen *L. henryi* species was recorded in late May — early July and the growth rate was 7.1–12.5 mm per day. The evergreen liana *L. japonica* is characterized by rapid activation of growth processes: from the third decade of April to the first decade of May (growth rate 5.6–10.5 mm per day). During this period, the annual growth of shoots in evergreen species reaches 32–57%. In mid-July, the growth of ivy *Lonicera* L. decreases and again increases in the third decade of August, and a second increase is observed until the second decade of September.

Growth characteristics of the shoots of the Lonicera L. genus

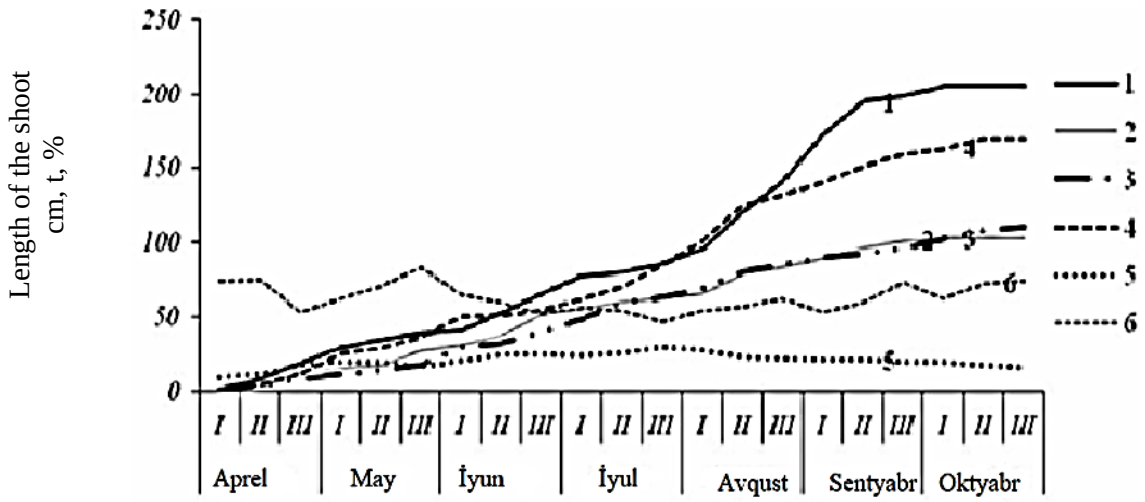

Figure 1. Growth of shoots formed in ivy species of *Lonicera* L. in 2020: 1 — *L. caprifolium*, 2 — *L. etrusca*, 3 — *L. henryi*, 4 — *L. japonica*, 5 — average air temperature, 6 — relative humidity

The average daily growth of the formed shoots weakens the growth rate of the shoots depending on the degree of humidity. However, the increase in drought coincides with the onset of hydrothermal stress. Summer depression of growth processes is observed in the most deciduous lianas *L. caprifolium* and *L. etrusca* and evergreen *L. japonica*.

The growth of deciduous and evergreen, straight shoots continues until the second decade of July. The growth curve increases linearly as a result of the stress observed during the drought of the growing season. The maximum growth rate was recorded at the beginning of the growing season (4.0–6.0 mm per day) and in the second half of May. 60–80% of the annual growth of shoots in the

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studied species is observed in the third decade of May and in the third decade of June. Subsequent growth continues at approximately the same rate until the third decade of July (Figure 2).

Thus, the studied straight *Lonicera* L. species can be classified as having a short growth period (up to 120 days).

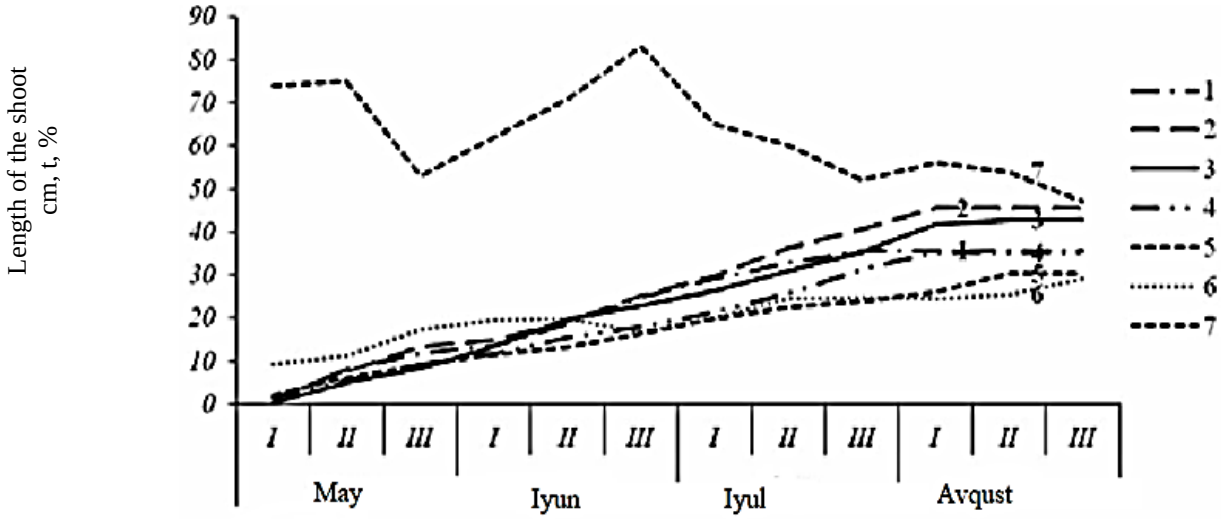

Figure 2. Growth of formation shoots in straight *Lonicera* L. species in 2020, 1 — *L. tatarica*, 2 — *L. maackii*, 3 — *L. fragrantissima*, 4 — *L. pileata*, 5 — *L. nitida*, 6 — average air ten-day temperature, 7 — relative humidity

After the growth period, the stabilization phase begins. At this time, the formation of the first and third-degree branching shoots occurs. The shoots formed on the branch are located at the top 4–5 joints. However, the formation of shoots formed in the form of *L. nitida* was recorded along the length of the branch. In *L. caprifolium*, *L. japonica* and *L. etrusca*, the branching shoots are located on top of the formed shoots and are associated with the ivy form of the shrubs. It should be noted that the length of the first-order branching shoots in this group of species is on average twice as long as in the group of straight *Lonicera* L. During stabilization, the upper part of the stalk formed by *L. fragrantissima* is curved, while in *L. nitida* the stalks have only the first degree.

There is no significant difference between vegetative and generative branching shoots in species belonging to the genus *Lonicera* L. In *Lonicera maackii*, the first-order shoots on non-flowering branches are twice as long as the flowering ones, reaching 55–60 cm, with more than 6 joints (i. e. they perform a growth function). In some species studied, a large number of new branching shoots are formed at the top of the shoots, which increases the decorative life of the umbrella. The results of the annual growth of shoots formed in branching are shown in Table.

Table

GROWTH OF SHOOTS OF THE *Lonicera* L. SPECIES DURING THE GROWING SEASON OF 2020

Group	*Species*	*Length umbrella formation, cm*	*Average growth of length branches branching, cm*	
			1 Row	*2 Row*
Straight *Lonicera* L. plant species	*L. maackii*	45,4± 7,2	17,5 ± 3,4	9,0 ± 2,3
	L. fragrantissima	42,8± 5,8	15,2 ± 2,1	—
	L. tatarica	35,7± 4,2	12,4 ± 3,8	8,5 ± 3,6
	L. pileata	35,2±3,9	10,3±2,2	5,1±2,0

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Group	*Species*	*Length umbrella formation, cm*	*Average growth of length branches branching, cm*	
			1 Row	*2 Row*
Ivy *Lonicera* L. plant species	*L. nitida*	30,2±5,6	12,1±3,2	—
	L. caprifolium	205,4± 21,4	51,1±4,6	12,0±3,8
	L. japonica	169,9±15,2	39,7±4,8	12,3±3,5
	L. henryi	110,5±12,4	28,5±7,1	11,0±3,2
	L. etrusca	103,1±14,7	40,3±6,5	10,2±4,1

Formation shoot in ivy *Lonicera* L. can change its direction of growth many times, depending on the presence or absence of support.

Conclusion

The peculiarity of the growth rhythm of annual shoots in species belonging to the *Lonicera* L. genus, introduced in the conditions of Absheron, is a well-defined periodicity, associated with the cessation of growth processes or their sharp weakening during the hot and dry seasons. Different rhythms of growth processes are characteristic of straight and ivy *Lonicera* L. Each group includes deciduous, semi-evergreen and evergreen species, but no difference in the rhythm of growth processes was found due to these features of life forms. The evergreen *Lonicera* L. is characterized by a steady increase throughout the growing season and a lack of biological dormancy, while in the plains it ceases to grow at the end of June, and the deciduous species of this group have a rest time in the autumn-winter period. The growth rate measured during the growing season provides a basis for the selection of *L. fragrantissima*, *L. caprifolium* and *L. japonica* in the straight group of *Lonicera* L. that are at high growth parameters. The most intensive growth was observed in May-June and September. The maximum annual growth was recorded in *L. caprifolium* 205 cm (formation shoot). The size and formation of shoots depend on environmental factors.

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