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## RESULTS OF INTRODUCTION OF *Jasminum sambac* IN ABSHERON

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## РЕЗУЛЬТАТЫ ИНТРОДУКЦИИ *Jasminum sambac* В АПШЕРОНЕ

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*Abstract.* Bioecological features, propagation methods root system and agrotechnics of Arabian jasmine (*Jasminum sambac*) which belonging to Lian group plants have been presented in the paper. The light-loving Arabian jasmine plant is grown in shaded conditions, yellowness is observed on the shoots, which leads to growth retardation have shown in results of studies. The studies were carried out in various conditions — in the shadow, on light, under the sun. In plants grown in the shade in the summer (July-August), the growth of the main shoot was not observed, compared with plants grown in direct rays in January-February, which, had growth in contrast to them, Highest results were obtained in August using green cuttings under studying of the reproduction of *Jasminum sambac*. No diseases have been observed in these plants, but they were susceptible to pests such as Aphidoidea, Diaspididae and Aleyrodidae during the research. Bioecological features of species, easily propagation by vegetative way, decorative appearance throughout the year allow us to use them design of interiors with plants has revealed.

*Аннотация.* В представленной работе были изучены биоэкологические особенности, методы размножения, корневая система и агротехника Жасмина арабского (*Jasminum sambac*), относящегося к растениям группы лиан. Исследования показали, что при выращивании светолюбивого растения Жасмина арабского в затененных условиях на побегах наблюдается желтизна, что приводит к задержке роста. Исследования проводились в различных условиях — в тени, на свету, под солнцем. У растений, выращиваемых в тени летом (июль-август), не наблюдалось роста главного побега, по сравнению с растениями, выращенными под прямыми лучами в январе-феврале, у которых, в отличие от них, наблюдался рост. При изучении размножения *Jasminum sambac* было установлено, что самые высокие результаты были получены в августе при использовании зеленых черенков. За годы исследований у этих растений не выявлено болезней, но они были восприимчивы к таким вредителям, как Aphidoidea, Diaspididae и Aleyrodidae. В результате выявлено, что биоэкологические особенности вида, легкость размножения вегетативным путем,

декоративность, позволяют в течение года использовать их в оформлении растительных интерьеров.

*Keywords:* vegetative propagation, twig, cover condition, bioecology, pests.

*Ключевые слова:* вегетативное размножение, веточка, состояние покрова, биоэкология, вредители.

### *Introduction*

*Jasminum sambac* species belongs to the *Jasmine* genus, the *Oleaceae* family. Plants belonging to the Lian group do not have the ability to stand upright. They only have special organs - tendrils, air rootlets, leaf petioles, thorns, and so on, through which they grow up based on any support. Since many species of them are tropical and subtropical origin, that is why they are mainly cultivated in covered conditions - greenhouses, orchards, winter gardens in the Absheron condition. [1]. Present *Indian jasmine* species stands upright and growing by twining any support. It is naturally growing in Asia's tropical and subtropical zones. That is why they drying in open, cold climate (below 6–8°C) conditions of Absheron. Therefore, the plant can only be grown in close conditions with temperature above 8–10 °C in Absheron.

### *Material and methods*

The research works were carried out during 2012-2017 years, in covered conditions in Absheron, and average indicators were selected on the obtained based results. As study material was used 10 old plants, 10 (from each) one and two year old twigs. Vegetative propagation was based on T. V. Khromova method [3], study of the growth dynamics of the main shoots in different growing conditions was based on A. Molchanov and B. N. Smirnov [10]. Phenological observations were carried out according to the methodology prepared by the main Botanical Garden of Russia [5]. The study of the root system was carried out on the basis of the methodology of V. Kolesnikov [4, 12]. At the same time, a number of bioecological features have been studied based on our visual observations in the Absheron close conditions.

### *Result and discussion*

*Jasminum sambac* is an evergreen, perennial plant that belongs to the *Jasmin* genus, included in the olive family (*Oleacea*) (Figure 1). This plant can reach in 4-6m length by climbing or beating any support.

Without applying for any support, with the regular cutting of stretching shoots, we can give the balloon shape to the plant. The shoots are soft-hairy. During the spinning round the prop, these hairs have a big role. Have, shiny leaves and tubular, waxy-white flowers. They have light-green leaves, short petiole, oval-shaped with 2, 5-10cm length and an almost flat bright surface. The flowers are small and white with the 5-7 petals and the 3-4 flowers located in a group in the umbellate form and very aromatic. One flower lives up to 20 days. However, during this time forming new flowers and the plant covers with the flowers during the spring-summer month. Fruits that are purple or black are not edible. The plant naturally spread out in tropical and subtropical zones of Asia [2, 6, 8, 11].

The *Jasminum sambac* is mostly cultivated as the ornamental and aromatic plant in the floristic designer of the interior. At the same time, making flowers alone or with black tea make it

very prominent as a fragrant drink. Both fresh and dried flowers can be used for this purpose [2, 13, 14].



Figure 1. Arabian Jasmin (*Jasminum sambac* L. Ait.)

Arabian Jasmin needs support system. Depending on the taste, the stands can be different in structure like-square, rhombic, double, and so on. Since the plant is capable to grow 4–6 m in length, it is desirable to plant in front of large windows in interior design. In this case, the plant is fully provided with light. It isn't recommended to put it in the kitchens or bedrooms. In the evenings releases more essential oils. That is why standing near the plant for a long time cause headaches. For the planting of this flower, should be chosen lightly areas in the southeast part of the building in workplaces and winter palaces [1, 9].

*Jasminum sambac* was propagated by vegetative way –bending and covering the shoots and by twigs (Table 1).

Table 1  
 THE BREEDING OF *Jasminum sambac* SPECIES WITH THE PENS IN COVERED CONDITION

Material	The features of the pens					The planting time of the pens	The number of the pens	Waking up	The forming of the callus	The forming of the roots	The number of the growing pens	%-
	Age	Length (sm)	Diameter (mm)	The number of the buds	The distance among the buds							
Young twig	2	12–14	8–10	3–4	4–5	10.IV	10	05.V	10.V	25.V	6	60
	2	12–15	8–10	3–4	4–5	20.VIII	10	10.IX	20.IX	05.X	5	50
Old twig	1	12–15	4–5	3–4	4–5	20.VIII	10	05.IX	—	10.IX	8	80

The long-term phenological observations showed that the *Jasminum sambac* is a light-sensitive plant. The shoot's growth zone becoming yellow and stops its development in little shady conditions (Figure 2). However, during the summer months, especially in the afternoon hours the direct sunlight negatively influences the plant (Table 2).

Table 2

GROWTH DYNAMICS OF THE MAIN STEM  
 OF THE JASMINE SPECIES UNDER DIFFERENT CONDITIONS (cm)

Measurement date	In shadow		Lightly place		Under sun light	
	Monthly	General	Monthly	General	Monthly	General
30.01	—	—	—	—	2.0±0.5	2.0±0.5
30.02	—	—	3.0±0.50	3.0±0.5	5.0±0.5	7.0±0.5
30.03	5.0±0.5	5.0±0.5	10.0±1.0	13.0±1.0	12.0±1.0	19.0±1.0
30.04	8.0±2.0	13.0±2.0	12.0±1.0	25.0±1.0	20.0±2.0	39.0±2.0
30.05	15.0±2.0	28.0±2.0	20.0±2.0	45.0±2.0	22.0±2.0	61.0±2.0
30.06	18.0±1.0	22.0±1.0	22.0±2.0	67.0±2.0	5.0±1.0	66.0±1.0
30.07	20.0±1.0	66.0±1.0	20.0±2.0	87.0±2.0	—	66.0±1.0
30.08	10.0±1.0	76.0±1.0	15.0±1.0	102.0±1.0	—	66.0±1.0
30.09	12.0±2.0	88.0±2.0	18.0±1.0	120.0±1.0	5.0±1.0	71.0±1.0
30.10	8.0±1.0	96.0±1.0	12.0±1.0	132.0±1.0	12.0±1.0	83.0±1.0
30.11	5.0±1.0	101.0±1.0	10.0±1.0	142.0±1.0	7.0±1.0	90.0±1.0
30.12	2.0±0.50	103.0±0.50	5.0±0.50	147.0±0.50	3.0±1.0	93.0±1.0

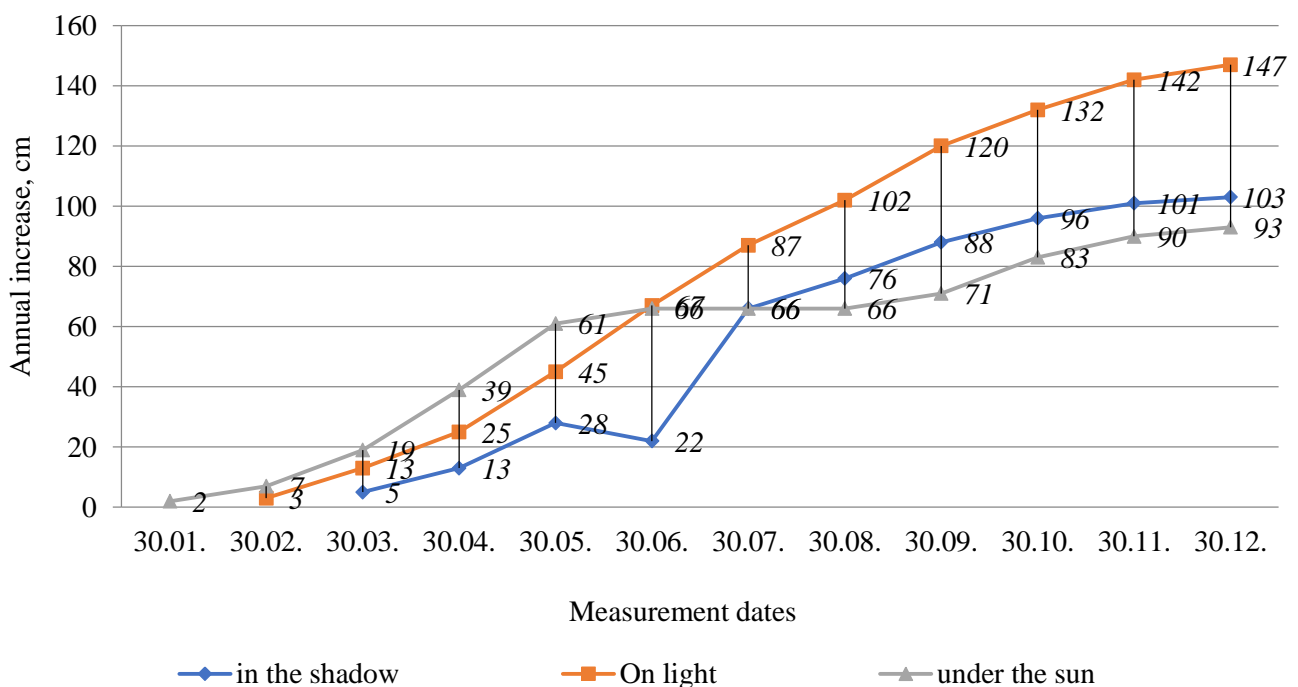


Figure 2. Growth dynamics of main shoot of *Jasminum sambac* L. specie in different conditions (with cm)

As a research material was used one-year, two-year and three-year plants. At the end of the vegetation period, during the period of relative silence, the roots of the plants were removed from

the substrate, washed, cleaned, and taken measurements. During the study of roots, reference was made to the methodology of V. A. Kolesnikov [4]. The results of the research are given in Table 3.

It is known that main roots do not form from shoots. However, several primary roots are formed from the underground joints of shoots. As a result of research, it was found that 80% of the main roots, we mean 4 of them developed from the last joint, and 20% from the middle joint. The root has not developed from the distance between the underground vertebrae and the root collar in the Sambac jasmine.

As can be seen from Table 3, the 3-year-old Sambac jasmine has a strong fibrous root system. It was observed that the main mass of the fibrous root system is located at a depth of up to 30 cm in the soil.

Table 3

1–3-YEAR-OLD SAMBAC JASMINE ROOT SYSTEM

<i>Height of the above ground part (cm)</i>	<i>Root collar diameter (cm)</i>	<i>Number of primary roots (pieces)</i>	<i>Diameter of primary roots (mm)</i>	<i>Length of primary roots (cm)</i>	<i>Length of lateral roots (cm)</i>	<i>Number of lateral roots (cm)</i>	<i>Diameter of lateral roots (mm)</i>	<i>Depth of main root mass (cm)</i>
<i>Firs year*</i>								
12.0±1.0	0.2±0.1	5.0±1.0	2.0±0.5	15.0±2.0	10.0±2.0	25.0±1.0	0.10±0.05	15.0±1.0
<i>Second year**</i>								
25.0±1.0	0.50±0.20	5.0±1.0	4.0±0.5	22.0±1.0	12.0±2.0	35.0±1.0	0.10±0.05	25.0±1.0
<i>Third year***</i>								
30.0±1.0	2.0±0.10	5.0±1.0	7.0±1.0	25.0±1.0	18.0±1.0	60.0±1.0	0.10±0.05	30.0±1.0

Note: \* — I order lateral roots; \*\* — II order lateral roots; \*\*\* — III order lateral roots



a



b

Figure 3. Old *Sambac jasmine* root system: a) First year, b) Second year

As can be seen in Table 1, during the January-February months there was not observed any growth in the shadow. The fastest growth was recorded in June-July (18-20 cm per month). In this case, the main shoot annual total length was 103.0 cm.

Although the plants grown in under direct sunlight was recorded growth in the January-February (7.05 cm). However, compared with plants growing in shade conditions in July and August there was no major growth in the plants growing in shade conditions. The annual height growth was relatively less (93 cm) than other plants. The highest values were observed in plants that was growing not under direct sun light, but in more light areas. Plants growing in this condition begin to development from the February and monthly-observed normal growth. Main shoot annual growth was 147. It was the highest value of cultivated plants.

Jasmine more intensively developing and growing in Mild — hot (25–30 °C) temperature conditions. Our observations showed that when the temperature is above 35 °C, the plant’s growth decreasing in cultivation conditions. The temperature of the building where the plant is cultivated should be kept in 15–16 °C in the winter months. In this case, in spring and in summer its blossom becomes weak.

This plant is humidity demanding. Our researches show that in cultivation conditions when the moisture of the air is 65–75% the plant intensively blossoms. When humidity is dropping in, the intensity of flowering is reduced and the flowers fall down in a short time. In order to keep the regime of air humidity the plant should often splash water in spring and in summer. At the same time, the moisture of the cultivating soil must be normal. However, in the winter months by reducing watering, the plants should be kept in the cool regime rooms.

The *Jasminum sambac* is also nutrient demanding. It should be cultivated in peat soils. The plant is growing better and abundant blossoming when it feeds with the complex fertilizers (N, P, K) and the microelement (Fe, Cu, Zn and etc.) twice in a month.

Phenological observations were made on the aged plants of Sambac jasmine in the Central Botanical Garden indoors condition (greenhouse) in 2012–2017.

During the investigation were studied following phenological phases and their duration: awakening (swelling of buds, opening of buds), formation of new leaf axils, budding, flowering (beginning, mass, end), shedding of old leaves, vegetation period [7, 13].

Our goal in the study of phenological phases was to achieve its efficient use. The results of phenological observations are given in Table 4.

Table 4

PHENOLOGICAL OBSERVATIONS OF SAMBAC JASMINE INDOORS  
 IN ABSHERON (2012–2017)

Awakening		Formation of new leaf axils	Budding	Flowering			Shedding of old leaves		vegetation period
Buds	Buds			Begin-ning	Mass	End	Begin-ning	Ending	
15.03	15.04	25.04	10.04	20.04	30.04	10.11	10.05	10.06	Evergreen

In the middle of March in the covered conditions of Absheron when minimum temperature reach 20–22 °C, Sambac jasmine started to grow. When in the temperature is low, awakening and other phenological phases are delayed. Old leaves gradually turn yellow and fall off only after 5-6 years. When the branches and shoots of the plant are dense and the place of cultivation is shady, the

leaves fall off more often in 3–4 years. In winter, when the temperature in the greenhouse drops to +10 °C, the leaves fall off en masse.

As can be seen from Table 1, flowering begins in the second half of April and lasts until November. However, flowering intensifies and weakens intermittently.

Observations have shown that during flowering this condition is repeated several times in the growing season. Our long-term observations have shown that the intensity of flowering decreases when plants are not regularly cared for (watering, nutrition, softening the bottoms, etc.).

Despite its long and intensive flowering, it did not bear fruit. The life of a flower lasts 2–3 days.

During bending and covering the shoots method, we select one of the side shoots and clean covered part from the leaves. At the same time pot filled with nutrient soil and sand (1:1 ratio) leaving next to the mother plant and shoot cleaned from leaves is planting to this pot. New plants are watering constantly and after 25-30 days, they separated and were grown independently. It should be noted that such breeding being more effective when the room temperature kept between 20–25 °C

During propagation by twigs were used spring or summer twigs. Twigs were cut in the 12–15 cm length, planted in the mixture of leaf humus and grained soil in 1:1 ratio. On the planted twigs, only leaving 1–2 leaves and others cutting down. The box in which are planted twigs is covered by the glass and watered regularly by keeping in the rooms with the temperature 18–20 °C. In this environment, the twigs are rooted during the 40-45 days. The highest result was observed in summer twigs in August (Table 2).

Rooted annual twigs can be transfer to permanent places. The care to *Jasminum sambac* in its permanent places are consists of the following: the setting of support system, constantly watering, feeding with nutrients, pruning depending on a given shape.

During our research years there weren't observed any disease in *Jasminum sambac*. However, it has been detected that some pest insects have severely damaged this species.

We can mention the following pest insects: bloody aphids, flavorings and *Pieris rapae*. In order to eliminate or minimize the harmful effects of insects, as soon as they appeared in the plant they were immediately hand-cleaned and in most cases the damaged leaves and branches were cut down.

When pests massively affected plants, the most effective and environmentally effective method of struggle was used the boiling soap solution of walnut leaves, bitter pepper and thornapple leaf or fruit in room conditions. For this purpose, 1 kg of walnut or thornapple leaves or 200 g of bitter pepper is boiled for 30 minutes in 10 liters of water and added in it 200 g of raw soap. After cooling, it is filtered and the 1-liter solution is mixed with 10 liters of water and then sprinkled with sprouts. The main solution maintains its quality in a dark cool place for a month.

There also have been studied the structure, growth and development characteristics of the root system in the plants of Sambac jasmine propagated by shoots [2].

Studies have shown that a strong fibrous root system is formed only on light and nutritious substrates. On the contrary, in heavy and fast-hardening soils, the roots do not grow well. Thus, the results of the study of Sambac jasmine in the covered conditions of Absheron showed that it can be successfully used in the vertical landscaping of interiors.

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