

UDC 633.88

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BIOECOLOGICAL FEATURES OF SOPHORA JAPONICA L. IN THE CONDITIONS OF KARAKALPAKSTAN

Annotation: the article presents the results of a study of the bio-ecological features of *Sophora japonica L.* introduced in the conditions of Karakalpakstan.

Key words: bio-ecological features, introduction, experience, flowering, fruiting, seeds, phenology, rutin, flavonoids.

Landscaping in cities and towns is one of the most effective ways to improve the environmental situation. To implement effective landscaping, it is necessary at least to know what plant species can grow in a given region, and as a maximum, to create mother plantations of the most promising tree species and develop methods for their mass reproduction. These problems are solved with the help of plant introduction. Japanese Sophora is not only an ornamental, but also a medicinal, melliferous plant.

Research objectives: to study the seasonal rhythm of growth and development of Japanese Sophora in new conditions for them;

Object and subject of research. Botanical Garden of the Karakalpak Branch of the Academy of Sciences of Uzbekistan, an experimental site of the Aral Sea Innovation Center under the President of Uzbekistan, located in the city of Nukus.

Research methods. Biological, ecological, botanical and statistical methods were used. As well as, the methods used in the introduction study of woody plants were used in the work. One of the most widely used medicinal plants, both in folk and scientific medicine for various diseases, is Japanese Sophora (*Sophora japonica L.*) and is included in the pharmacopoeias of many countries.

Japanese Sophora - *Sophora japonica L.* - a large tree from the legume family (Leguminosae or Fabaceae). In appearance, Sophora resembles an acacia, especially when flowering occurs. It grows up to 20-25 m in height; the crown is sprawling, umbrella-shaped or spherical. In our conditions, the height of the trees does not exceed 10 m. The trunk is covered with dark gray bark with deep cracks. Stems of young branches are greenish-gray, pubescent with short hairs. The leaves are alternate, large, 11 to 25 cm long, with pubescent petioles, pinnate; consist of 9-17 almost sessile leaflets. Leaflets oblong-ovate, 2-5 cm long, shiny, dark green above, glaucous below. Young branches are green, without thorns.

Japanese Sophora grows wild in China, Korea and Japan. It is widely cultivated outside its natural range as an ornamental plant. Garden forms have been developed that differ from wild-growing weeping or, conversely, pyramidal crowns. In some decorative forms, the flowers are purple in color. In Russia, this tree species is bred mainly in the Rostov region, Krasnodar and Stavropol regions, since its normal growth and development requires a long growing season [1].

Japanese Sophora - *Sophora japonica L.* has been used for many hundreds of years in scientific and folk medicine for various diseases. Buds serve as a source of industrial production of rutin and quercetin. A tincture is prepared from the fruits, which is used in the form of irrigations, washes or tampons for the treatment of eczema, acute and chronic purulent inflammatory processes. The listed range of pharmacological activity can be substantiated by the activation of regeneration processes, which implies a positive effect on the immune status [2].

The biological value of Japanese Sophora fruits is determined by the high content of flavonoids, triterpenoids and polysaccharides. Medicines from the fruits of

Sophora japonica can have anti-inflammatory and immunomodulatory effects [3.4].

Japanese *Sophora* is used for pulmonary bleeding, skin diseases, liver diseases. *Sophora* decoctions and infusions are good for dysentery, gastric and duodenal ulcers, inflammatory processes, and phlegmon. *Sophora* is used orally for high blood pressure, as a sleeping pill, to improve appetite, dysentery. It perfectly helps with infectious diseases of the oral cavity, vagina, skin, with its help cure or significantly alleviate conditions in psoriasis, eczema, diathesis, dermatitis, bedsores, trophic ulcers, acne [2]. Japanese *Sophora* is one of the most popular medicinal plants for the treatment of hemorrhagic vasculitis. *Sophora* is effective in such diseases as angina pectoris and hypertension, rheumatism, diabetes mellitus, sclerotic stratification of the walls of blood vessels. *Sophora* tincture is used to treat a huge number of diseases; it is effective for rheumatism, sepsis, gastritis and colitis, stomach and duodenal ulcers, kidney and liver diseases, typhus, diarrhea, early stages of tuberculosis and to combat worms [3.4].

It should be noted, given the prospects of the Japanese *Sophora*, as an ornamental, medicinal, as well as a melliferous plant, the Decree of the Cabinet of Ministers of the Republic of Uzbekistan “On measures to increase the planting of tree species “Japanese *Sophora*” and “Horse Chestnut” (No. 186, dated September 7, 2007) was adopted. In Uzbekistan, Japanese *Sophora* is bred as an ornamental plant in all forestry enterprises, nurseries for growing seedlings. *Sophora* is propagated by seeds. It is characterized by rapid growth, in the first year the height reaches 1.20-1.35 m, and by the age of 5 the trees grow up to 6-7 m tall. However, according to the literature, this tree blooms at a very respectable age. In the conditions of Karakalpakstan, Japanese *Sophora* blooms and bears fruit at the age of 6-7. The plant is photophilous, drought- and salt-resistant. Although it belongs to heat-loving species, mature trees can withstand fairly severe frosts, if, of course, they are short-lived. The growth of *Sophora* in the climatic conditions of Karakalpakstan begins at an average daily temperature of 10-15°C. In the conditions of the south of Karakalpakstan, flowering can continue until the end of

October. Individual flowers live 3-4 days. Sophora has a well-defined periodicity of flowering. During abundant flowering, up to three hundred thousand flowers were counted on individual old trees. In our observed experiments in 2021-2022, they bloomed in the third decade of May. Yellow-white irregular flowers of Japanese Sophora are collected in large loose-paniculate inflorescences; the flowering period falls in the second half of summer. The flowers are fragrant, relatively small, no more than 1 cm in diameter, collected in large paniculate inflorescences, reaching a length of 20 and even 35 cm, located at the ends of the branches. The flowers are irregular, of the so-called moth type common to most legumes, with 5 green sepals, 5 yellow-white or pale pink petals, 10 stamens and a pistil with an upper ovary. The fruits appeared at the end of the second decade and at the beginning of the third decade of June. The fruit is green beans, but later acquire a dark red skin. Like other legumes, the fruits are enclosed between two indehiscent leathery valves. They are formed in September. The fruit is a fleshy, reddish, indehiscent bean, 5–10 cm long and about 1 cm thick, with deep intercepts between seeds, i.e., clear-shaped. Since the flowers are collected in inflorescences, the beans that appear after flowering also form a kind of bunch. Each bean contains 3 to 8 seeds. The seeds are reddish or almost black, kidney-shaped, similar in shape to beans, but smaller.

Under the conditions of Karakalpakstan, effective temperatures for the beginning of flowering are 1228.2 ± 15.1 °C, and for the end - 1900.6 ± 23.9 °C. The flowering period of Japanese Sophora can last from 35 to 150 days, depending on the place of growth, meteorological conditions. Flowering of Japanese Sophora: the flowering phase is divided into two flowering sub-phases: "beginning of flowering" and "full flowering (mass)". Despite the establishment of these flowering phases in Japanese Sophora, during the entire flowering period, plants always have buds, blooming flowers and faded flowers. The highest summer temperatures were observed during the entire study period (2021-2022). June is the main month in the vegetative development of Sophora, as this is the flowering period. The maximum high temperatures in June (above +35°C) had a positive

effect on the growth of annual shoots and the appearance of luminiferous inflorescences. This was observed in June-July 2021-2022, when the maximum temperature averaged +37.5°C. Japanese Sophora blooms from June to September. In the conditions of Karakalpakstan, flowering can last for four months. Individual flowers live 3-4 days. Sophora has a well-defined periodicity of flowering. An interesting feature is that in the evening, the leaves curl up and fall, and with the advent of the first rays of the sun, they unfold again. The leaves of this plant fall very late - in November.

Experiments have shown that the plant is not whimsical; it grows both in the sun and in partial shade; propagated mainly by seeds. Phenological observations have shown that it is not picky about soil conditions.

Conclusion

Japanese Sophora is a drought-resistant plant, not demanding on soil conditions, and did not need constant watering. Despite all the shortcomings in the agrotechnical methods of cultivation, Japanese Sophora favorably tolerates local soil and climatic conditions, is well preserved and grows quite quickly at a young age and, with rare placement, bears fruit abundantly.

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