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INTENSIVE CULTIVATION METHODS OF JAPANESE PAGODA TREE (*SOPHORA JAPONICA* L.)

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Abstract: This article analyzes the efficiency of propagating Japanese pagoda tree (*Sophora japonica* L.) through seed sowing in special trenches, the seed germination percentage, and germination periods. During the study, the advantages of the trench method compared to open-field cultivation and its effects on biometric indicators were investigated.

Keywords: Japanese pagoda tree, trench, stratification, germination, vegetation, period, nursery.

In the Republic of Uzbekistan, several regulatory documents have been adopted aimed at developing nursery production in forestry, particularly expanding plantations of medicinal and ornamental plants. According to Resolution No. PQ-171 of the President of the Republic of Uzbekistan dated May 31, 2023, on measures to transform the field of ecology and environmental protection and organize the activities of the authorized state body, the Japanese pagoda tree was identified as one of the main species for urban greening due to its drought resistance and aesthetic importance.

There are many plants surrounding us, and each plant possesses its own unique characteristics. The Japanese pagoda tree (*Sophora japonica* L.), as an ornamental and medicinal plant, is one of the tree species that develops very well under the climatic conditions of Uzbekistan and is widely cultivated in many forest nurseries. The seeds of Japanese pagoda tree are distinguished by their hard seed coat and delayed germination under natural conditions. Propagation through special trenches during seed cultivation provides an opportunity to create an optimal microclimate for seeds and improve germination capacity.

The Japanese pagoda tree belongs to the Fabaceae family and is distinguished by its resistance as well as ornamental and medicinal properties. Its native habitat is East Asia, particularly China and Korea. The species was introduced to Japan in ancient times for cultural and religious purposes and later spread throughout the world as an ornamental and medicinal tree. It was introduced into the climatic conditions of Uzbekistan in the mid-20th century and is now fully adapted to local soil and climatic conditions, occupying one of the leading positions in urban greening systems.

The Japanese pagoda tree is a large tree reaching 25–30 m in height, with a broad umbrella-shaped crown. Its trunk is covered with dark gray deeply fissured bark, while young shoots are distinguished by their dark green color and smooth texture. The leaves have a pinnate structure and retain their dark green color until late autumn, which prolongs the ornamental period of the plant. One of its most important biological characteristics is its relatively late flowering period, occurring in July and August**,** compared to many other tree species.

The experiments were conducted during 2026 in the Baliqchi Forest Department of the Andijan State Forestry Enterprise within the framework of the science-project-practice chain, including the establishment of experimental plots for genetic selection, seed laboratories, and intensive seedling production methods. During propagation by seeds, the seeds were first subjected to **scarification** and then soaked in hot water. The control treatment consisted of sowing Japanese pagoda tree seeds directly in open field conditions.

For trench sowing, seeds were planted in trenches with a depth of 40–50 cm**,** filled with a special nutrient substrate consisting of humus, sand, and soil in a ratio of 1:1:2, which produced favorable results. According to the research findings, because soil temperature in the trenches was 3–5°C higher than in the open field, the germination period was significantly shortened. Under the trench method, initial and complete seed germination occurred approximately twice as fast as in the control (open-field) treatment. In trenches, the first seedlings appeared within 13–14 days**,** while complete emergence was achieved within 20–22 days**.** In contrast, under open-field conditions this process was considerably delayed **(**22–40 days**).** Better heat and moisture retention inside the trenches resulted in improved and earlier germination.

The germination percentage was also evaluated, revealing significant differences. Under the trench method, 88% of the seeds germinated, which is considered a very high indicator and demonstrates that nearly all seeds developed normally. In contrast, under open-field conditions, germination reached only 62%**.** It was noted that environmental factors in the open field, such as wind, temperature fluctuations, and soil drying, caused the loss of a portion of the seeds.

Table 1. Germination periods of Japanese pagoda tree seeds

Sowing method	**Sowing date**	**Initial germination (days)**	**Complete germination (days)**	**Germination percentage (%)**
Open field (Control)	March 15	22–25	35–40	62%
Trench method	March 15	12–14	20–22	88%

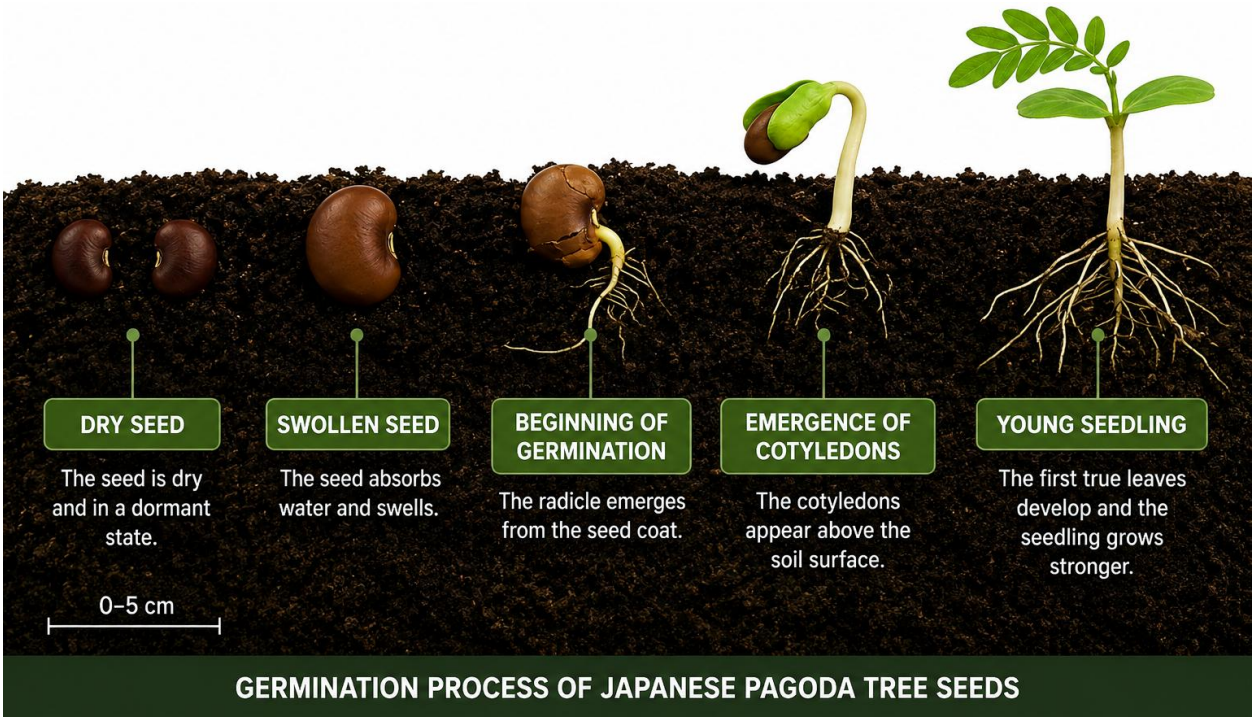

Figure 1. Beginning of the life cycle of Japanese pagoda tree: the process of transformation from seed to seedling

As a result of maintaining stable soil moisture in the trenches, seedling development was also accelerated. During the first 45 days of the vegetation period, seedling growth changed as follows.

Measurements carried out during the initial 45-day period of seedling development showed that the trench method promoted seedling growth more effectively compared to open-field conditions. The height of seedlings grown in trenches reached 11.7 cm**,** which was nearly 1.5 times higher than the value observed in the open field (7.4 cm). The most significant difference was observed in the root system. The roots of seedlings grown in trenches reached 16.5 cm, penetrating intensively into the deeper soil layers, whereas under open-field conditions this indicator reached only 10.2 cm**.**

A significant difference was also observed in leaf development. In the open field, seedlings remained weaker and produced only 2–3 true leaves, whereas under the trench method, due to favorable microclimatic conditions, the number of leaves reached 4–6. This indicates that the photosynthetic surface of the plants was formed more rapidly under the trench method.

Table 2. Biometric indicators of seedlings (45 days old)

Treatment	Seedling height (cm)	Root length (cm)	Number of leaves (pcs.)
Open field	7.4	10.2	2–3
Trench method	11.7	16.5	4–6

The germination rate of seeds under the trench method was 26% higher**.** The main reason for this was the heat released from the decomposition of organic fertilizers at the bottom of the trench and the prevention of moisture evaporation. The shortening of the germination period by **10–15 days** allowed the seedlings to establish a stronger root system before the onset of hot summer conditions.

Figure 2. Experimental plots and seed propagation using the trench method

Conclusion

Propagation of Japanese pagoda tree (*Sophora japonica* L.) in trenches makes it possible to

maximize laboratory and field germination rates of seeds up to 88–90%**.**

Seeds sown using the trench method germinated within 12–14 days**,** which is approximately twice as fast as the conventional method.

This method is recommended as a cost-effective and highly efficient technology for nursery management systems.

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