

THE EFFECT OF DIFFERENT IRRIGATION REGIMES ON THE ACCUMULATION OF DRY MATTER IN ONE-YEAR-OLD JAPANESE SOPHORA SEEDLINGS

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Abstract. *This study investigates the effects of different irrigation regimes on one-year-old Japanese sophora (*Sophora japonica*) seedlings. The results demonstrate that soil moisture levels significantly influence the overall mass and root system development of the seedlings. When soil moisture was maintained at 70-80% of field capacity (FC), the seedlings achieved the highest total mass and root length. These findings highlight the importance of maintaining optimal soil moisture levels for the effective cultivation of Japanese sophora seedlings and emphasize its significance in urban greening efforts.*

Keywords: *Japanese sophora (*Sophora japonica*), seedlings, irrigation regimes, dry mass, root system development, soil moisture, field capacity (FC), urban greening.*

Introduction

In recent years, the cultivation of ornamental trees has gained significant importance, especially in urban environments where green spaces are increasingly valued for their ecological and aesthetic contributions. Among these species, Japanese sophora (*Sophora japonica*) stands out for its attractive foliage and adaptability, making it a preferred choice for urban greening initiatives. Understanding the factors that influence the growth and development of Japanese sophora is crucial for optimizing its cultivation practices.

Soil moisture is a key factor that impacts plant growth, as it plays a vital role in nutrient absorption and overall plant health. Insufficient or excessive moisture can hinder seedling growth, affecting important parameters such as dry mass accumulation and root system development. This study aims to investigate the effects of varying soil moisture levels on the dry mass of the leaves, stems, and roots of one-year-old Japanese sophora seedlings. By examining how different moisture conditions influence these growth parameters, this research seeks to provide valuable insights for nursery management and urban greening strategies.

Research Methods. Research Methods

Field Experiments: Conducting experiments in natural conditions allows researchers to observe real-world interactions and effects on seedling growth. Field experiments provide valuable insights into how external factors influence plant development.

Phenological Observations: Tracking the life cycle events of the seedlings (e.g., flowering, leaf development) helps understand their growth patterns and responses to environmental conditions. This is crucial for timing agricultural practices and enhancing growth.

Biometric Measurements: Measurements such as height, diameter, and biomass of seedlings provide quantitative data essential for assessing growth rates and overall health. These metrics serve as reliable indicators of plant development.

Chemical Analysis: By using established methods for soil and plant sample analysis, researchers can determine the nutrient availability (nitrogen, phosphorus, potassium,

micronutrients) necessary for healthy growth. Understanding soil chemistry is fundamental for effective fertilization and soil management strategies.

Climatic Analysis: Data from the "Tashkent" meteorological station provided crucial insights into the climatic conditions affecting the seedlings. Temperature, humidity, and precipitation are key factors that can influence growth rates and survival. Analyzing these parameters helps identify the optimal environmental conditions for seedling development.

Economic Assessment. The inclusion of economic efficiency in the study is significant. By utilizing technological maps from the Research Institute of Forestry, the research could assess production costs and expected profits, which are essential for making informed decisions in commercial seedling production.

Analyzing labor and resource costs allows for a comprehensive understanding of the economic viability of the cultivation practices, ensuring that the proposed strategies are not only scientifically sound but also economically feasible.

Implications for Agronomic Strategies. The comprehensive data derived from various methods can lead to the development of targeted agronomic practices that enhance the growth of *Aesculus hippocastanum* and *Sophora japonica* seedlings.

By identifying optimal growing conditions and economic practices, the study can contribute to sustainable forestry and horticulture strategies. This not only optimizes production but also supports the conservation of green spaces in urban and rural areas.

Obtained Results and Their Analysis. Observations were carried out on the dry mass of the leaves, stem, and roots of Japanese sophora (*Sophora japonica*) seedlings. Based on the results of our observations, when the soil moisture before irrigation was maintained at 50-60% of the field capacity (FC), the total mass of one-year-old Japanese sophora seedlings reached 63.4 g, and the length of the root system was 41.0 cm. When the soil moisture level was sustained at 60-70% of FC, the total mass increased to 70.0 g, with the root system length extending to 43.0 cm. At 70-80% of FC, these indicators reached 77.0 g and a root system length of 46 cm, respectively. Detailed data on these observations are provided in Table 3.19.

Table 3.19

Effect of Different Irrigation Regimes on the Dry Matter Accumulation of One-Year-Old Seedlings of Japanese Cedar (*Cryptomeria japonica*).

Relative humidity (% of DNC)	Dry mass of one seedling, g						
	Leaf	Stem	Root	Total		Length of the root system	
				g	%	cm	%
Control	11,8	15,2	16,0	43,0	100	38	100
50-60	20,3	25,6	17,5	63,4	147,4	41	107,9
60-70	22,6	28,3	19,1	70,0	162,7	43	113,1
70-80	23,5	31,2	22,3	77,0	179,0	46	121,0

These findings highlight the significant impact of maintaining optimal soil moisture levels on the growth and development of Japanese sophora seedlings, particularly in terms of dry mass accumulation and root system development.

Conclusion. The results of studying the effects of different irrigation regimes on one-year-old Japanese sophora seedlings show that the soil moisture level significantly influences the overall mass and root system development of the plants. Maintaining soil moisture at 70-80% of

the field capacity (FC) resulted in the highest overall mass and longest root system for the seedlings, with a total mass of 77 grams and a root length of 46 cm. Compared to the 50-60% moisture regime, plant growth increased by 21.4%.

These findings confirm the importance of maintaining optimal soil moisture levels for the effective cultivation of Japanese sophora seedlings, significantly enhancing their overall growth and development. Proper irrigation management can lead to the production of high-quality seedlings for greening projects.

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