

**RESEARCH ON SEED GERMINATION METHODS OF THE DATE PALM (PHOENIX DACTYLIFERA L.) AND ITS SIGNIFICANCE IN LANDSCAPE DESIGN****Kholova Shokhista Abduvositovna**

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**Abstract.** The date palm (*Phoenix dactylifera* L.) is one of the most ancient cultivated fruit and ornamental plants, possessing high economic, ecological, and aesthetic value. In the context of global climate change and the expansion of urban greening programs, there is an increasing interest in studying its propagation methods and improving seed germination efficiency.

This paper examines the biological characteristics of the date palm, its significance in agriculture and landscape design, as well as experimental methods for pre-sowing seed treatment. A comparative analysis was conducted on the germination of seeds soaked in cold water, warm water, and a control group without treatment. The results indicate that pre-soaking seeds in warm water significantly accelerates and enhances the germination rate.

The findings of this study can be applied in agronomy, ornamental horticulture, and environmental landscaping programs.

**Keywords:** date palm, seed germination, agricultural techniques, landscaping, *Phoenix dactylifera*, germination rate, arid plants.

**Introduction.** The date palm (*Phoenix dactylifera* L.), a member of the Arecaceae family, is one of the oldest cultivated plants known to humanity. Archaeological and historical sources indicate that its cultivation began as early as the 4th millennium BCE in the civilizations of Sumer, Assyria, and Egypt. The fruits of the date palm—dates—possess high nutritional value, containing 62–71% sugars, 1–2.5% proteins, and approximately 2.5% fats, along with vitamins, minerals, and bioactive substances [3, 6].

Currently, the date palm is widely distributed across regions with arid and semi-arid climates, including North Africa, the Middle East, and South Asia. Due to its high tolerance to drought and soil salinity, it is of particular interest for the greening of arid territories.

Numerous scientific studies have been dedicated to the biological and agrotechnical characteristics of the date palm. D. Baliga et al. (2011) provided a detailed analysis of the chemical composition of date fruits, their antioxidant properties, and their impact on human health [4].

The Food and Agriculture Organization (2021) report outlines date palm cultivation technologies, soil and climate requirements, and methods for irrigation and plant protection [5].

Furthermore, research by Mélanie Gros-Balthazard et al. (2017) utilized genomic analysis to study the domestication history of the crop, identifying the origins and dispersal routes of the date palm [7].

In Uzbekistan, the development of environmental programs, such as the "Yashil Makon" (Green Space) national project, creates favorable conditions for introducing resilient and ornamental plants into urban and rural landscaping systems. According to the Decree of the President of the Republic of Uzbekistan dated May 31, 2023, "On measures for transforming the sphere of ecology and environmental protection and organizing the activities of the authorized state body," the "Yashil Makon" nationwide environmental project is being actively implemented, aimed at expanding green zones and improving the ecological state of the environment [1].

**Biological Characteristics of *Phoenix dactylifera* L.** The date palm is a dioecious woody plant characterized by a robust root system and a tall, sturdy trunk. Its leaves are pinnate, large, and possess significant ornamental value. The plant is distinguished by its high drought tolerance and the ability to survive under extreme environmental conditions.

The fruits contain: 60–70% sugars, 1–2 % proteins, Up to 2.5% fats, B-complex vitamins, minerals, and antioxidants. These properties make dates a valuable food product widely utilized in human nutrition.

**Materials and Methods.** The object of the study was the seeds of the date palm (*Phoenix dactylifera* L.) obtained from mature fruits [2].

The experimental treatments included: cold water soaking: Seeds were soaked in cold water for 24–48 hours, warm water soaking: Seeds were soaked in warm water for 24–48 hours, control group: Seeds were planted without any pre-sowing treatment. The study employed several research methods, including a literature review, experimental cultivation, comparative observation, and biometric assessment of the germination rate.

**Results and Discussion.** The experimental findings revealed that seeds pre-soaked in warm water exhibited the highest germination rate. Soaking in cold water resulted in moderate germination levels, while the control group showed the lowest and most delayed germination. The most active germination phase was observed within the first 15–20 days following sowing.

The data obtained confirm that pre-sowing soaking facilitates:

- Activation of enzymatic processes;
- Acceleration of seed swelling;
- Enhancement of germination energy.

The seeds were sown in a light, breathable soil substrate (Table 1). Observations were conducted over a period of 45–55 days under stable temperature and humidity conditions.

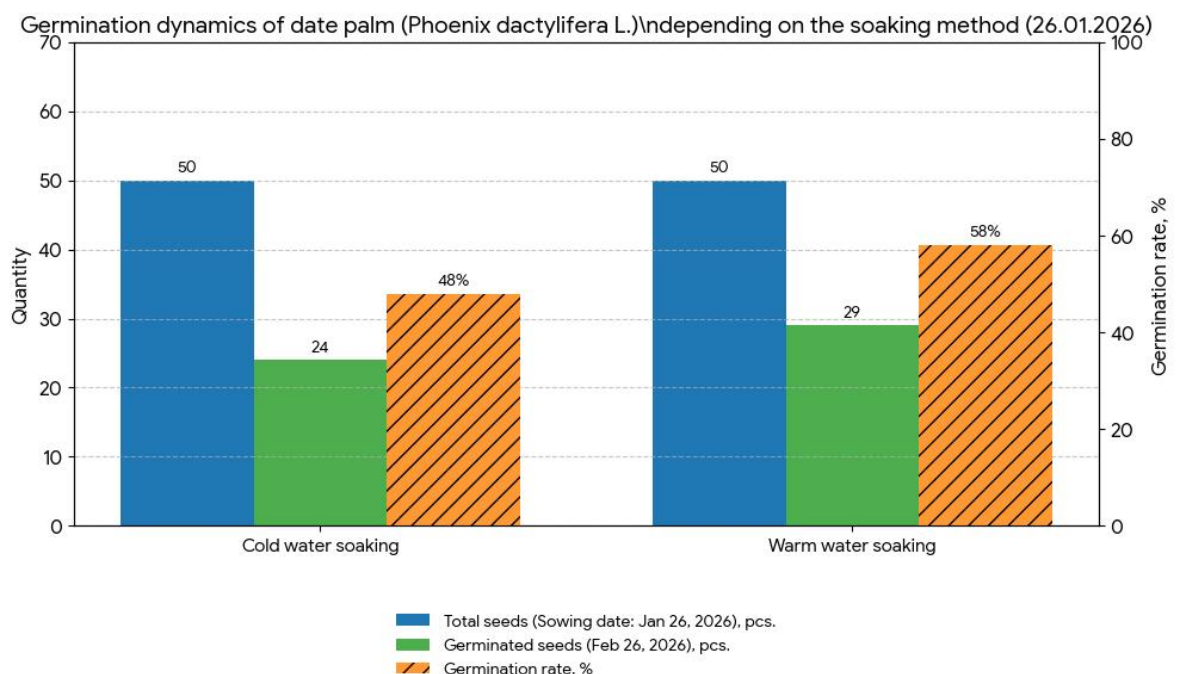
**Table 1**

Germination dynamics of date palm (*Phoenix dactylifera* L.) seeds depending on the soaking method (as of February 26, 2026)

Treatment	Number of seeds (Sowing date: Jan 26, 2026)	Germinated seeds (Feb 26, 2026), pcs.	Germination rate, %

Cold water soaking	50	24	48
Warm water soaking	50	29	58

**Analysis of Results.** As shown in Table 1, the germination of date palm (*Phoenix dactylifera* L.) seeds was studied using two methods of pre-sowing preparation. The first method involved soaking the seeds in cold water, while the second method utilized warm water. In both treatments, the soaking duration ranged from 24 to 48 hours. Following the treatment, the seeds were sown into a prepared soil substrate characterized by high air and moisture permeability. Observations of the germination process were conducted over several weeks, as illustrated in Diagram 1.



**Discussion of Results.** The research findings indicate that pre-sowing seed treatment has a significant impact on both the germination rate and the speed of emergence. The most effective method proved to be soaking the seeds in warm water, which resulted in a germination increase of up to 58%. This effect can be attributed to the physiological processes occurring within the seed during hydration. Elevated water temperature facilitates the accelerated penetration of moisture through the seed coat, activates enzymatic systems, and stimulates the metabolic activity of the embryo. Consequently, this leads to more rapid seed swelling and earlier seedling emergence. The simplicity and accessibility of the warm water soaking method make it a highly efficient agrotechnical practice for improving the quality of planting material in nurseries and agricultural enterprises.

The experimental data established that seeds soaked in warm water germinated faster and exhibited a higher germination percentage compared to those soaked in cold water (Fig. 1).



Figure 1. Seeds germinated after warm water soaking.

**Practical Significance.** The date palm has wide applications in the following areas: landscape Design: Greening of parks and urban areas, as well as creating ornamental compositions for indoor environments. Ecological Stabilization: Soil erosion control and climate adaptation in arid regions, such as the Surkhandarya and Kashkadarya regions.

**Conclusion.** The conducted research demonstrates that pre-soaking date palm seeds in warm water is the most effective method for accelerating germination and increasing the overall germination rate. Due to its resilience, ornamental appeal, and economic value, the date palm represents a promising crop for both agriculture and landscape architecture. The findings of this study can be utilized to develop agrotechnical recommendations for cultivating this species in arid climate conditions.

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