



Section 1. Biology sciences

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BIOECOLOGY AND DEVELOPMENTAL FEATURES OF THE KALANCHOE PLANT (KALANCHOE)

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Abstract

This article presents the results of a comprehensive study of the bioecological characteristics, morphological characteristics, and vegetative propagation capacity of Kalanchoe, a plant widely used as an ornamental and medicinal plant. The article examines the species' adaptive mechanisms, its ecological plasticity, growth and development conditions in indoor cultivation, and the effectiveness of vegetative propagation under controlled conditions. Kalanchoe has been found to be highly resistant to adverse environmental factors, capable of accumulating moisture in tissues, and intensively forming “pupae” on leaves, which contributes to its widespread distribution and practical value.

Keywords: *Kalanchoe, medicinal plants, succulents, vegetative propagation, bioecology, introduction*

Introduction

The use of medicinal plants has an ancient history and is linked to the development of medicine. Plants are an important source of biologically active substances used for the treatment and prevention of diseases, and for strengthening the body. In modern times, interest in medicinal plants is growing due to the development of phytotherapy and the search for natural alternatives to synthetic drugs. Uzbekistan's flora is highly diverse, including numerous medicinal and ornamental species, among which plants with dual me-

dicinal and ornamental value are particularly important.

One such species is Kalanchoe, widely used as a houseplant and medicinal plant, possessing wound-healing and anti-inflammatory properties. Despite its widespread distribution, its bioecological characteristics remain poorly understood, necessitating further research.

Materials and methods

The study involved Kalanchoe plants cultivated under laboratory conditions at the

Department of Agroecology and Introduction of Medicinal Plants of Berdakh Karakalpak State University.

The research was conducted in the spring and summer of 2025 and included a combination of field and laboratory observations. The primary methods used included a morphological description of the plant, phenological observations, analysis of vegetative propagation, assessment of growth parameters, and a comparative analysis of the survival rate of transplanted specimens. The following parameters were recorded during the observations: plant height, number of leaves and “pupae,” length and width of leaf structures, shoot formation rate, and rooting rate during transplantation. To assess propagation effectiveness, a series of experiments were conducted involving the transplantation of young plants obtained vegetatively.

Results and discussion

Experimental studies have shown that *Kalanchoe*, both in laboratory conditions and during controlled introductions, demonstrates high adaptability to substrate and agronomic conditions. When replanting plants, preparation of the soil medium and drainage layer was of particular importance. A drainage layer of medium-sized stones was placed at the bottom of the pots, topped with a layer of sand and fertile substrate. To ensure optimal water management, the drainage holes were closed, and the surface was covered with a 2–3 cm thick layer of expanded clay. In pots larger than 12–15 cm in diameter, the drainage layer was increased to 5–7 cm, which helped prevent water stagnation and the development of root rot.

When planting, the root system was positioned so that the root collar was level with the substrate surface, ensuring uniform development of both the above-ground and underground parts. After transplanting, the plants were placed in warm conditions with moderate watering and periodic exposure to direct sunlight (2–3 times per week). It has been established that excessive pruning of the root system (removing up to 1/3 of the roots) or above-ground mass temporarily reduces growth intensity, but in some cases, it stimulates lateral shoot formation.

Observations showed that *Kalanchoe* exhibits a pronounced capacity for vegetative reproduction characteristic of viviparous plants. Specialized buds (“plantlets”) form on the leaves and subsequently develop into independent individuals. This process occurs naturally: along the margins of the leaf blades, embryonic shoots are produced, which detach and root upon contact with the substrate. As a result, a single leaf can give rise to up to 22–36 young plants, confirming the high reproductive potential of the species.

Observations revealed that, when the mother plant reached a height of 20–25 cm, active vegetative bud formation began early in its development. By April 14, 2025, individual specimens had reached a height of 25 cm and already had developed leaf structures with developing “pups.” By May 27, 2025, the plant height had increased to 26 cm, with the formation of up to 16 leaf segments with vegetative buds.

In an experimental propagation of 25 young plants obtained vegetatively, the survival rate after 40–45 days was 60–70%, demonstrating the high effectiveness of this method. Indoors, the stable development of 32–33 plants in separate experimental plots was observed, confirming the stability of the adaptation process.

The results confirm that *Kalanchoe* is a highly adaptable succulent plant, exhibiting remarkable tolerance to various growing conditions and a high regenerative capacity. An effective drainage system (using expanded clay and a sand layer) plays a key role in preventing substrate overwatering and creating optimal conditions for root development.

It has been established that the survival rate and subsequent development of plants directly depend on the quality of soil preparation and proper watering. Excessive watering leads to root suppression, while a moderate water regime promotes active growth and the development of vegetative organs.

Of particular importance is the unique mechanism of vegetative propagation of *Kalanchoe*, based on the formation of “pupae” on the leaves. This method of propagation ensures high reproduction rates and the survival of offspring without the need for seed production. The biological characteristic of this “viviparous” propagation makes *Kalan-*

choe an effective candidate for mass cultivation and introduction.

The high survival rate (60–70%) confirms the plant's practical value in indoor gardening and its potential for further use in ornamental and medicinal plant growing. It should also be noted that Kalanchoe exhibits tolerance to temperature and light fluctuations, making it suitable for cultivation under low-maintenance conditions. Thus, the bioecological characteristics of Kalanchoe, including its succulent tissue structure, ability to accumulate moisture, and active vegetative propagation, ensure its wide adaptability and high practical value.

Conclusion

Thus, Kalanchoe is a succulent plant with high ecological adaptability, a pronounced capacity for vegetative propagation, and significant resistance to adverse environmental conditions. The study results showed that this species has high potential for use in ornamental plant growing and phytotherapy. The findings can be applied to the introduction, mass propagation, and development of indoor medicinal plant cultivation technologies.

References:

- Volzhanova M. I., Bailman R. A., Suslina S. N., Bykov V. A. Kalanchoe pinnate and degremona: chemical composition, application in medicine (review) // Issues of biological, medical and pharmaceutical chemistry. 2010. – Vol. 8, No. 7. – P. 14–21.
- Karomatov S. V. Medicinal plant Kalanchoe // Biology and integrative medicine. 2016. – No. 4. – P. 66–71.
- Marinina T. F., Savchenko L. N., Saushkina A. S. Study of the possibility of complex use of the plant Kalanchoe pinnate // Bulletin of the Samara Scientific Center of the Russian Academy of Sciences. 2015. – Vol. 17. – No. 5–1. – P. 143–148.
- Sazhina N. N., Lapshin P. V., Zagorskina N. V., Korotkova E. I., Misin V. M. Comparative analysis of the antioxidant activity of Kalanchoe juices // Chemistry of plant raw materials. – 2013. – No. 3. – P. 113–119.

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