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Morphometry Of Seeds Of The Leonurus Genus Species In Karshi Conditions

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Abstract
This study examines the morphometric and biological characteristics of seeds of Leonurus turkestanicus and Leonurus cardiaca in the agroecological conditions of Karshi. Observations conducted in 2023–2024 measured the length, width, and weight of 1000 seeds. Additionally, the biological characteristics, medicinal significance, and agroecological requirements of L. cardiaca were analyzed. The results demonstrated the high adaptability of these species to Karshi's climatic conditions, providing an important basis for their use in agrotechnology and pharmacology.

Keywords: - Leonurus turkestanicus, Leonurus cardiaca, seed morphometry, agroecological conditions, Karshi, biological characteristics.

Introduction
Species of the Leonurus genus, belonging to the Lamiaceae family, hold significant importance in folk medicine and modern pharmacology. Leonurus cardiaca L. (English name "Motherwort," Uzbek name "modargul") is a perennial plant characteristic of European flora and is used to treat cardiovascular diseases, nervous system disorders, and women's health issues (e.g., conditions related to the menstrual cycle and menopause) (Co., 2024). Its phytochemical composition includes alkaloids (leonurine), flavonoids, and glycosides, which are effective in stabilizing heart function and calming the nervous system. Leonurus turkestanicus is characteristic of Central Asian flora and shares similarities with L. cardiaca in phytochemical and pharmacological properties. Studying the seed morphometry and biological characteristics of these species, as well as evaluating their introduction and agroecological adaptation, holds practical and scientific significance. This article analyzes the morphometric parameters of seeds of L. turkestanicus and L. cardiaca and the biological characteristics of L. cardiaca in Karshi conditions.

Materials and Methods
The study was conducted in 2023–2024 under the agroclimatic conditions of Karshi. For each species, Leonurus turkestanicus and Leonurus cardiaca, 10 seed samples (n=10) were selected. The length, width, and weight of 1000 seeds were measured in laboratory conditions using standard metrological instruments. Results are presented as the arithmetic mean (M) and standard error (m). Biological characteristics were evaluated by analyzing plant growth dynamics, ecological requirements, and phytochemical composition based on literature data.

Results
The morphometric parameters of the seeds are presented in the following table:

Plant Name	Year	Seed Length, mm	Seed Width, mm	Weight of 1000 Seeds, g
Leonurus turkestanicus	2023	1.89 ± 0.038	0.69 ± 0.043	0.24 ± 0.013
	2024	2.23 ± 0.032	1.20 ± 0.035	0.26 ± 0.015
Leonurus cardiaca	2023	2.31 ± 0.040	1.24 ± 0.041	1.20 ± 0.040
	2024	2.37 ± 0.040	1.28 ± 0.041	1.32 ± 0.022

Discussion

The study results indicate that the morphometric parameters of L. turkestanicus and L. cardiaca seeds significantly increased from 2023 to 2024. These changes are attributed to the plants' adaptation to Karshi's agroecological conditions, particularly their high adaptability to climatic and soil factors. The seeds of L. cardiaca are larger in size and weight compared to L. turkestanicus, which may be related to its genetic characteristics and ecological adaptation. Biologically, L. cardiaca exhibits high adaptability and thrives in sunny locations with moderate humidity. Its development slows in shaded conditions, requiring full sunlight for optimal growth. The nectar-rich flowers attract bees and other pollinators, contributing to increased biological diversity in agroecosystems. The seeds of this species are open-pollinated and can be propagated by direct sowing or through seedlings. The plant is notable for its resistance to drought, insects, and animals (e.g., deer).

Conclusion

1. The species Leonurus turkestanicus and Leonurus cardiaca demonstrated a high degree of adaptation under Karshi's introduction conditions. The morphometric parameters of their seeds increased over the years, confirming successful adaptation to climatic and soil conditions.
2. L. cardiaca holds medicinal value and is used to treat cardiovascular and nervous system disorders. Its nectar-rich flowers contribute to increasing the number of pollinators in agroecosystems.
3. The agrotechnology of these species is simple, with high resilience and minimal care requirements. Further in-depth studies of their phytochemical composition and pharmacological properties are recommended.

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