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THE PROSPECTS OF CULTIVATING LEONURUS TURKESTANICUS IN SOUTHERN REGIONS OF UZBEKISTAN

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ABSTRACT

The article presents the results of scientific research on the cultivation of _Turkestan Lion's Tail_ (Leonurus turkestanicus). The germination rate of the plant seeds was 82.5% under laboratory conditions, 82.2% in the field, and the preservation rate was 93-95%. In the first year, the plants were fully formed, reaching a height of 30-45 cm, with a yield of 0.7-0.8 tons per hectare.

Intensive growth of the plants was observed from the second year of life onwards, with the generative (July-September) period being recorded. During this year, their yield reached 18-20 tons per hectare. In the third and subsequent years of life, the main stem height reached 105.7 cm, with a yield of 25-27 tons per hectare.

INTRODUCTION

The Action Strategy for the Development of the Republic of Uzbekistan for 2017-2021 sets "optimizing agricultural land use and crop rotation, introducing advanced agrotechnologies to increase yields, and expanding the production of fruits, vegetables, and grapes" as one of its key objectives [1]. Therefore, it is crucial to expand scientific research on the cultivation of medicinal and food plants, taking into account their biological characteristics, as well as developing and implementing new technologies.

Turkestan Lion's Tail (Leonurus turkestanicus) is a valuable medicinal plant included in the "Pharmacopoeia of Uzbekistan" due to its medicinal properties and practical applications [7].

Research Object and Methods: Turkestan Lion's Tail (Leonurus turkestanicus v. Krecz. et Kupr.) is a perennial herb belonging to the Lamiaceae family, reaching a height of 50-150 (sometimes 200) cm. It grows mainly in the middle part of the mountains, on stony and gravelly-soiled slopes in the mountainous areas of the Tashkent, Samarkand, and Surxondarya regions of Uzbekistan in Central Asia [11]. It is used in traditional medicine to calm nerves, treat heart disease, and headaches. It is also used in official medicine for the treatment of heart and blood vessel neurosis, hypertension, and atherosclerosis [5].

Field experiments were conducted based on the recommendations of the Forestry Department of the Ministry of Agriculture and Water Resources of Uzbekistan, "Shifobaxsh" DØE and QIM [2], as well as guidelines developed in 2015 by specialists and scientists from the Forestry Department of the Ministry of Agriculture

and Water Resources of Uzbekistan, the Ministry of Agriculture and Water Resources, the Institute of Botany of the Academy of Sciences of Uzbekistan, and Uzfarm sanoat DAK [9].

For laboratory germination studies, 100 seeds were sown in Petri dishes with four replicates. In field conditions, 100 seeds were sown in rows with a depth of 1.5-2.0 cm, with four replicates. The percentage of germinated seeds was calculated based on the total number of seeds [6, 9]. The bio-ecological characteristics of the plant were determined based on its biometric and phenological indicators [7].

To determine the yield, a sample and diagonal method was used. The medicinal plants were harvested in three replicates per square meter, measured while wet, and the wet weight of the raw material was determined. After drying, the raw material was re-weighed and the average yield per hectare was calculated.

RESULTS AND DISCUSSIONS

Seeds of Turkestan Lion's Tail (Leonurus turkestanicus) exhibit good germination properties, with full emergence occurring within 30-35 days. Experimental results indicate that the germination rate of the seeds averaged around 82.5% under laboratory conditions (Table 1).

1-table

Germination Rate (%) of Turkestan Lion's Tail Seeds Under Laboratory Conditions

№	Sowing Dates and Control Days							Germination Rate
	3	**5**	**10**	**15**	**20**	**25**	**30**	**%**
1	2	6	12	24	17	17	9	91
2	1	6	12	15	22	11	11	78
3	2	6	16	15	21	18	5	83
4	1	5	17	15	19	14	7	78
Average								82.5%

To determine the germination rate of Turkestan Lion's Tail seeds under field conditions, they were sown in two different seasons: late autumn (November) and spring (April). Experimental results showed that seeds sown in autumn (November) exhibited a higher germination rate, ranging from 78% to 82%. In contrast, the germination rate of seeds sown in spring (April) did not exceed 60-63%. Specifically, the average germination rate for seeds sown in November was 82.2%, while for those

sown in April, the rate was significantly lower, at approximately 61-63%. The germination rate of seeds sown in late autumn and spring differed significantly (Table 2).

2-table

Field Germination Rate (%) of Turkestan Lion's Tail Seeds Sown in Spring

Planted Rows	Number of Seeds	Sowing Time 15.11.		Germination	Sowing Time 15.04.		Germination
		Sprouted			Sprouted		
		Emergence	finish	%	Emergence	finish	%
1	100	23.03	05.04	73	28.04	18.05	63
2	100	27.03	06. 04.	87	27.04	17.05	62
3	100	23. 03	07. 04.	85	29.04	21. 05	58
4	100	26. 03	08. 04.	84	21.04	24. 05	62
Average				82,2			61,2

Our analysis suggests that the relatively lower soil temperatures (5-7°C) during late autumn are not sufficient for seed germination. However, rainfall during this period has a positive effect on seed germination. Seeds sown at this time undergo natural stratification, resulting in higher germination rates.

Conversely, in spring-sown seeds, increasing air temperatures (12-17°C) and decreasing soil moisture from April onwards lead to a decrease in their germination rate to 61.2%. This suggests that spring-sown seeds require partial stratification (or soaking in water for 24 hours) before sowing.

In 2014 and 2022, industrial plantations (planted on March 25th) were established at the Yakkabog Specialized Forestry using seedlings in a 10x2m scheme, with Turkestan Lion's Tail seeds sown between the rows (Table 3).

3-table

Turkestan Lion's Tail Planting Scheme

Plant name	Row Spacing, m	Spacing Between Plants in a Row, m	Number of Seedlings per Hectare, units
Turkestan Lion's Tail	0,7	7-8 кг (15-20см) 5 Unit	71000

The germination rate of seeds sown in autumn was recorded to be 80-85%, with a preservation rate of 95.8%, while spring-sown (April) seeds exhibited a germination rate of 60-63% and a preservation rate of 93.7%.

Observations showed that seedlings emerging from autumn-sown seeds had higher growth and development rates in the first year of vegetation. For instance, the plant height was recorded at 46.1±1.7 cm, the number of leaves was 24.8±2.9, and the lignification of the main stem averaged 7.3±1.3 cm. Conversely, seedlings emerging from spring-sown seeds had an average main stem height of 38.3±2.74 cm and 14.2±1.5 leaves. In both scenarios, lignification of the main stems during vegetation was recorded at around 10-15%. Turkestan Lion's Tail plants were irrigated 8-10 times during the first year of vegetation and weeded 3-4 times. Experiments indicate that maintaining such agrotechnical practices can lead to a yield of 0.7-0.8 tons per hectare in the first year.

Inensive growth in the plants was observed from the second year of vegetation onwards, with the main stem height reaching an average of 85.3±4.6 cm and the number of leaves reaching 42.4±2.1. The main stems produced an average of 8.4±0.7 first-order branches, with a length of 12.2±1.4 cm and 19.2±2.3 leaves. The plants grew rapidly during vegetation and budded in mid-July. The main stems of the plants grew to 85.3±3.88 cm, with 42-58.4 (±5.04) leaves developing. The lignification of the main stem was 12.5%. The budding and flowering period continued until the end of vegetation. By the end of September, an average of 87.8±4.5 bud clusters, 73.6±4.63 flower clusters, 309.0±6.42 developing fruit clusters, and 302.0±7.39 ripe fruit clusters were observed per plant. It is worth noting that some plants in the experimental field reached a height of 100-130 cm. In the second year of vegetation, the Turkestan Lion's Tail plantation, irrigated 7-8 times, achieved a yield of 18-20 tons per hectare.

In the third and subsequent years of the plant's life, the beginning of the vegetation period coincided with the early days of March. Their main stems grew to 105.7±4.6 cm and produced 68.4±5.1 leaves. The lignification of the main stem was recorded at 12.3-15.7 cm. During vegetation, they grew rapidly and budded from the end of June to the early days of July. The budding and flowering process continued in the plants until the end of September. By the end of September, an average of 137.8±2.22 bud clusters, 133.6±5.7 flower clusters, 126.0±4.2 developing fruit clusters, and 504.0±8.5 ripe fruit clusters were observed per plant. Some plants in the experimental field reached a height of 150-180 cm. In this year of development, the Turkestan Lion's Tail plantations were irrigated a total of 7-8 times, and the yield was recorded at 25-27 tons per hectare.

According to the data of Akhmedow et al., it is possible to harvest 25 tons of raw materials in the first year and 35 tons per hectare in subsequent years, along with 5-6 tons of seeds per hectare, by irrigating the plant 7-8 times and applying 110 kg of

nitrogen, 80 kg of phosphorus, and 60 kg of potassium. The plant can be maintained in the same field for 3-4 years [4].

According to the results of our scientific experiments, by irrigating the irrigated gray soil 8-10 times in the first year, 7-8 times in the second year, and 7-8 times in the third and subsequent years, it is possible to harvest a yield of 0.8-1.1 tons per hectare in the first year, 15-18.7 tons per hectare in the second year, and 23-25 (28.5) tons per hectare in the third and subsequent years. Seed yield in the third and subsequent years is 400-555 kg per hectare. It was found that Turkestan Lion's Tail can be maintained in the same field for 4-5 years. For example, the yield of plants in a field maintained for 5 years was 23-25 tons per hectare.

CONCLUSION

Thus, there are opportunities to sow Turkestan Lion's Tail in the late autumn and early spring months in Qashqadarya Region. The germination rate under laboratory conditions is 82.5% on average, while in field conditions, this rate is recorded at 78-82%. The germination rate of seeds sown in spring (April) does not exceed 60-63%. Seeds sown in autumn begin to sprout from mid-April onwards. If spring sowing is necessary, the seeds should be stratified for 10-15 days at low temperatures (3-5°C) before sowing.

- Intensive growth in the plants is observed from the second year of vegetation onwards, with the generative period being recorded. In the third and subsequent years, the start of the vegetation period coincides with mid-March, and the plants grow rapidly, budding from the end of June to the early days of July. This process continues until the end of September. By the end of September, an average of 137.8±2.22 bud clusters, 133.6±5.7 flower clusters, 126.0±4.2 developing fruit clusters, and 504.0±8.5 ripe fruit clusters are observed per plant.

- By irrigating the industrial plantations 8-10 times in the first year, a yield of 0.7-0.8 tons per hectare is achieved. In the second year, irrigation 7-8 times leads to a yield of 18-20.7 tons per hectare, while in the third and subsequent years, irrigation 7-8 times achieves a yield of 25-28.5 tons per hectare. In our opinion, the plant can be maintained in the same field for 5 years. For example, the yield of a field maintained for 5 years was recorded in the range of 23-25 tons per hectare. From the sixth year onwards, the yield gradually decreases (to 15-18 tons per hectare) due to competition and aging of the plants.

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