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Bioecological Features of The Plant *Verbena Officinalis* L. In The Conditions of Karakalpakstan

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Abstract. *Verbena officinalis* L. perennial herbaceous plant of the *Verbenaceae* family and a cultivated flower of the subshrub family. Its homeland is Peru. More than 200 species grow in the tropical and subtropical regions of the Americas. The flowers are corymbose, in a raceme 6-7 cm in diameter, white, red, pink, yellow, or purple. It is cold-resistant and does not freeze even under early snowfall. Verbena is propagated by seed. Seeds are sown in greenhouses in February and March. It flowers from June to October. The stem is erect and branched. The essential oil contained in the leaves and inflorescences is also used in perfumery.
Keywords: Verbena officinalis, Verbenaceae family

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Verbena officinalis L. perennial herbaceous plant of the *Verbenaceae* family and a cultivated flower of the subshrub family. Its homeland is Peru. More than 200 species grow in the tropical and subtropical regions of the Americas. The flowers are corymbose, in a raceme 6-7 cm in diameter, white, red, pink, yellow, or purple. It is cold-resistant and does not freeze even under early snowfall. Verbena is propagated by seed. Seeds are sown in greenhouses in February and March. It flowers from June to October. The stem is erect and branched. The essential oil contained in the leaves and inflorescences is also used in perfumery.

Verbena is a well-known medicinal plant. It has been used for medicinal purposes since ancient times. Ancient medicine believed that verbena in medicinal vinegar bandages healed wounds and prevented the spread of malignant ulcers. The decoction of the plant makes hair black. A decoction of verbena, when ingested, displaces urine, menstruation, and expels the fetus from the womb. If they perform ablution, it calms the itching in the vagina.

Verbena officinalis L. - grows naturally in Europe, Asia, North Africa, and the Caucasus. It is found in the wild in the territories of Uzbekistan, Kazakhstan, Tajikistan, Kyrgyzstan, and Turkmenistan, especially in foothill and valley zones, along roadsides, along ditches, and in cultivated areas. It is a light-loving plant, intolerant of shade. It is resistant to a dry climate, but loves moisture. It is not demanding on soil, grows well in sandy, light, neutral, or slightly alkaline soils. Optimal temperature: +18...+25°C. Vegetation period: 120-140 days. Flowering period: June-September. Fruiting: August-October.

The plant is a perennial or biennial herb. The rhizome is well-developed, brown, penetrating 20-30 cm deep into the ground. It is erect, quadrangular, branched, 30-80 cm tall. The leaves are oppositely arranged, pinnately dissected, with serrated, serrated margins. The flowers are small, violet or pink, gathered in inflorescences. The fruit consists of four small brown nuts.

Traditional medicine in different countries uses this plant for medicinal purposes. *Verbena officinalis* is used as a means of normalizing the menstrual cycle, as well as for painful dysmenorrhea, absence of menstruation and postpartum bleeding. It has been proven that the iridoid glycoside - verbenalin has a coagulating effect [1]. Indian medicine recommends the use of verbena tincture as a contraceptive [2]. In folk medicine of different countries, verbena officinalis is used as a tonic, expectorant, diaphoretic, cardiotonic, lactogenic agent, for amenorrhea, menorrhagia, liver diseases, spleen, anemia, metabolic disorders, thrombosis, gastric colic, it is applied externally as a wound healing agent for skin diseases [3], as well as for stomatitis, gingivitis, pharyngitis [4].

On March 6, 2025, I planted the plant from seed in the greenhouse of the Faculty of Biology. It began to germinate on March 24, 2025 (table-1). I watered and fertilized them on time. After full growth, when the plant's height reached 15-20 cm, on April 20, 2025, I planted it outside on the land allocated to us around our faculty to study the cultivation agrotechnology. At the same time, I carried out agrotechnical measures in the

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soil. I dug a ditch measuring 60x60 and planted my plants at a distance of 20 cm. Today, it is growing well, and I continue the experimental work.

Seedlings (February - March): Seeds are sown in boxes with a thin layer of substrate (or vermiculite). With a temperature of +22–240°C and humidity, seedlings germinate in 10–20 days.

Although seeds can be sown directly in open ground, this method is not very reliable due to its sensitivity to temperature fluctuations in the early stages of the plant. The optimal time for sowing seeds is February-March, and by the time seedlings are planted (late April-early May), the plants must be strong and adapted. The sowing process includes the following stages:

1. Preparation of a container with a drainage opening;
2. Filling with a substrate (peat + sand + vermiculite or a ready-made mixture for flowers);
3. Sowing seeds on the surface (without deepening) or under a thin layer of soil (1 mm);
4. Wetting by spraying;
5. Cover with film or glass to create a greenhouse effect.

For germination, the temperature must be +20...+22 °C, and germination can last up to 15-20 days. Adhering to a moderate irrigation regime is crucial, as excessive moisture can lead to dehydration.

The plant was loosened to a depth of 10 cm before planting. The seeds were sown mixed with soil biohumus. Since the optimal temperature for the plant is 20°C, it was planted in conditions corresponding to the ambient temperature. The plant's location was changed to ensure good germination.

Although verbena is considered an inexpensive plant, it requires regular, balanced care to ensure it thrives and blooms for a long time. The main measures are the correct establishment of the irrigation regime, the timely application of fertilizers, the removal of fallen inflorescences, and sanitary pruning.

Verbena should be watered moderately, especially during the warm months (June-August). The plant does not like excessive moisture, but cannot tolerate prolonged drought. Irrigation is carried out under the roots; to prevent the development of fungal diseases, water should not enter the leaves and inflorescences. On average, watering 2-3 times a week in the morning or evening is sufficient. In conditions of open sunny and sandy soil, frequent irrigation can be carried out, especially if the plant is grown in a container.

Additional feeding is carried out 3-4 times during the season:

Two weeks after planting, nitrogen fertilizer, urea, and other fertilizers are applied.

The seeds were imported from the Botanical Garden of the Academy of Sciences of the Republic of Uzbekistan. The vervain plant was studied by planting in several stages. The seeds were sorted and sown in Petri dishes in the first variant. Each Petri dish was initially planted with 10 to 100 seeds. Experiments on the germination of plant seeds were conducted in the laboratory of the Faculty of Biology of Karakalpak State University. In the first decade of March 2024, the seeds were sown in a Petri dish. In this case, the room temperature was +10–15 °C. Seed germination was monitored for 5-6 days. In the first ten days of April 2024, 100 seeds were sown in Petri dishes under laboratory conditions. In this case, when the room temperature was +18- +22°C, the seeds began to germinate in 2-3 days(Fig. 1). The sprouted seeds were sown in the pre-prepared soil. Thus, it has been determined that the required temperature for the germination of lagoch plant seeds must be +15°C.

Table-1

Germination of Verbena officinalis L. seeds under laboratory conditions (2025 seeds)

Petri dishes and seed count	**Sowing temperature**			Number of germinated seeds %
	+10-13^{0}C	+15-18 ^{0}C	+20-23 ^{0}C	
I. Petri dishes (100 pcs)	25	34	16	75
II. Petri dishes (100 pcs)	22	36	22	80
III Petri dishes (100 pcs)	30	38	20	88
IV Petri dishes (100 pcs)	29	33	21	83
Average	26,5	35,25	19,75	81,5

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(Fig. 1)*Seed germination of Verbena officinalis* **L.** *in greenhouse conditions*

To determine the germination of the plant under soil conditions, seeds sown in an aqueous solution with ash for one day were sown on household plots. To determine the germination of the plant under soil conditions, seeds stored for 24 hours in an aqueous solution with ash on household plots were sown in 4 rows of 100 pieces. Seeds from the Tashkent Botanical Garden were used for the experiment. The sown seeds were buried with soil at a depth of 1–1.5 cm. Irrigation was carried out from the bottom of the irrigation ditches until the seedlings germinated and true leaves 1 and 2 developed. Biometric calculations of the germination of seeds sown in field conditions were performed every five days. Data on determining the germination of the plant in field conditions are presented in Table 2.

As seen from the data provided in Table 2, despite the fact that reproductions of the seeds from the Botanical Garden were obtained to determine the germination of the vervain plant in field conditions, the seed germination of each row on the plots varies. The main reason for this was the quality of the prepared seeds, the depth of sowing, and the moisture content of the soils.

Table -2

Vegetativeness of the vervain plant in field conditions.

Rows	Large seeds Small seeds		Large seeds Small seeds	
	1-1,5 sm	2,5-3sm	1-1,5 sm	2,5-3sm
	seed germination days			
I	10	15	11	18
II	9	17	13	21
III	12	17	10	24
IV	14	16	16	16

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It should also be noted that when preparing plant seeds, it is first necessary to sort the large seeds formed from large flowers. Large seeds are formed from large inflorescences on early-ripening young stems; as shown in Table 3, the soil germination of seeds obtained from the Botanical Garden is 53.5%. The appearance of a well-developed agrocenosis is confirmed by the fact that the seedlings of a plant planted on household plots have fully sprouted.

Table-3

Sowing the verbena plant from seeds in a greenhouse under the conditions of Karakalpakstan

Month	Phenological stage	Plant height (cm)	Number of leaves (units)	Flowering state	Environment (temperature, °C)	Commentary
March	Germination	3-5	2-4	No	15-20	The seedlings began to appear
April	Vegetative growth	10-15	6-10	No	20-25	The leaves have developed actively
May	Active growth	20-30	12-18	No	20-25	The root system has strengthened
June	Beginning of flowering	30-50	20-25	Start time	25-30	The first flowers have bloomed
July	Full bloom	50-70	25-35	Active	30-35	Peak flowering period
August	Flowering continues	70	30-40	Upper	30-33	High pollination
September	Fruiting	70-75	25-35	Decreased	20-25	The seeds have formed
October	End of vegetation	70	15-20	No	15-20	Construction begins

We obtained vervain seeds from the Tashkent Botanical Garden and observed them by planting them in several ways. You studied it in a laboratory setting by planting it in a Petri dish. Then we set up experiments in the university greenhouse. In this case, seeds were sown in the first decade of March. The results are presented in Table 1. The end of the plant's vegetation period occurred in October. The height of the plant was 75 cm. During the experiment, active plant growth was observed in May, flowering in June, full flowering in July, and fruiting in September.

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