

Biology Flowering *Thymus Vulgaris* L. in the Conditions Oasis of Karshi

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Abstract: The article presents the morphological features of the *Thymus vulgaris* L. flower and the results of the diurnal dynamics of flowering, introduced for the first time in the conditions of the Karshi oasis. The flowers of *Th.vulgaris* L. have been found to belong to the group of plants that bloom during the day. The dynamics of daily flowering was studied and it was found that up to 957 flowers bloom on one plant during the day, flowers open from 8⁰⁰ to 11⁰⁰ hours (air temperature +15+20°C, relative humidity 45-50%), and the peak of flowering occurs at 9⁰⁰ hours.

Key words: thyme ordinary, flower, calyx, corolla, pistil, stamen, inflorescence, generative phase, flowering, diurnal flowering dynamics.

Introduction

Thymus vulgaris L. is an ordinary thyme, evergreen, small subshrub plant belonging to the of family Lamiaceae Lindl. Green aerial parts, leaves and young flowering twigs are valuable due to the accumulation of a large amount of essential oils. During the flowering period, the essential oil is 0.8-1.2%, the essential oil contains thymol (up to 42%), carvacrol, cymene, pinene, borneol, caryophyllene, linalool and others [1, 2]. In medicine, it is used as an antiseptic and disinfectant. The liquid extract extracted from the plant is part of Pertussin, which is used as an expectorant for whooping cough and bronchitis, and the essential oil is part of Hartmann's anesthetic fluid used for dental diseases. The leaves and young flowering twigs of the plant are found in herbal teas used for sore throats, chest, upper respiratory tract and vomiting. In addition, essential oils are widely used in the perfume industry, dried and fresh leaves as a condiment in the food industry [1, 3, 4, 5].

According to sources in the literature, the growth and development, physiological properties and productivity, in vitro reproduction of thyme under various conditions were studied [6, 7, 8, 9]. However, the plant is not widespread in Uzbekistan.

Th.vulgaris L. does not occur naturally in the flora of Uzbekistan. This species was originally introduced in the Tashkent Botanical Garden, but its bio-ecological features have not been studied on the basis of scientific research. In the conditions of the Karshi oasis,

Th.vulgaris L. was first introduced in 2012 from two-year-old seedlings. The seedlings grew well and bloomed in the new conditions, but gave fruitless seeds. Therefore, in 2014, the seeds were brought from the Timiryazev Moscow Agricultural Academy and grown from seeds in the conditions of the Karshi oasis. Studies have shown that under new conditions the plant has passed all stages of ontogenesis [10, 11]. The biology of flowering of *Th.vulgaris* L., which has completely passed the generative period in the conditions of the Karshi oasis, has been studied.

Flowering biology is part of plant reproductive biology. The flowering phase is the most important phase in plant ontogenesis, which is a system that shows the interdependence of all phenophases and the adaptation of a plant to a new environment [12].

An important indicator of adaptation is the flowering and formation of seeds of a species, introduced species into new conditions under these conditions [13, 14]. Only when the requirements of introduced species to environmental factors are adapted to new conditions, the plant will bloom, produce seeds and reproduce in new conditions. This has been reflected in many scientific studies, and the flowering biology of introduced species has been studied by many scientists in various conditions [13, 15, 16].

The purpose of the study. Study of the morphological features of the flower and the dynamics of the daily flowering of *Th.vulgaris* L. in the conditions of the Karshi oasis.

Research methods

To study the daily flowering dynamics of *Th.vulgaris* L. in the conditions of the Karshi oasis, the number of flowers opening every 2 hours from 5⁰⁰ in the morning to 19⁰⁰ in plants of the generative phase (n=10) was counted, the number of open flowers during the day and the time of oblique flowering on one plant, during beginning, mass and end of flowering [17]. The morphological features of the flower are given according to generally accepted criteria [18]. The results were analyzed statistically [19].

Research results

The small bisexual flowers of *Th.vulgaris* L. are arranged in a circle in the leaf axils at the top of the stem and are collected in small inflorescences, which together form a spike-shaped inflorescence. The flowers are zygomorphic. Pedicels are covered with glandular hairs, the length of which is equal to the length of the calyx. Calyxes are deep, five-toothed, green, covered with glandular hairs. Corollas are light pink, double-lipped, the upper lip consists of two flower leaves, the lower lip is curved downward and consists of three flower leaves.

The pistil is solitary, smooth, consists of two seed leaves, the tip of the stigma is two-part, the ovary is superior, four-socket, four-eremic. The number of pollen grains is 4, the front two are longer, and the back two are shorter, and they all grow together to the narrowed base of the corolla. Filaments are white, smooth. The anther is slightly curved, reniform. Ovary green (Fugire 1). The flowers of the plant are pollinated with the help of representatives of the bee family. The fruit of the coenobium consists of four nuts.

When a plant has buds, they are very small (1.0-2.0 mm) and take 12-15 days to bloom. At this time, the buds grow to 4.5-5.0 mm, the upper part of the cups opens, corollas begin to appear between the teeth of the cups. Initially, the corollas are purple, as the buds grow, the color begins to become light, and when the buds are fully opened, the corollas become light pink. During flowering, the buds that are ready to bloom will be larger than the rest. The opening of flowers was observed with the complete formation of plant buds, the length of the calyx reached 2.7 ± 0.17 mm, corolla 4.5 ± 0.20 mm. *Th.vulgaris* L. blooms acropetally.

In 2014-2017, in the conditions of the Karshi oasis, studies were carried out to study the daily flowering dynamics of *Th.vulgaris* L. According to research, in the conditions of the Karshi oasis in *Th.vulgaris* L. from the first year of vegetation, the formation of generative organs was observed. In the first year of vegetation, up to 8-10 inflorescences are formed in a plant, in the second year up to 90-140, in the third year up to 100-120 inflorescences [11]. In the inflorescence, the flowers are located in 8-10 whorls, and in one whorl there are 13-16 flowers. Studies have shown that one flower of *Th.vulgaris* L. blooms for 3-4 days, one inflorescence - 15-18 days, and a bush plant - 78-82 days. *Th.vulgaris* L. is a light-loving plant and can be included in the group of plants in which flowers bloom daytime [17, 20].

In the first year of the growing season (2014), the plant bloomed very rarely, and in the subsequent growing season, the flowering process is similar to each other. The flowering biology of *Th.vulgaris* L. was studied in 2015-2017. In our study, the beginning of flowering was mainly in early April, mass flowering was in the second half of April - first half of May. Flowering period 78-84 days, mass flowering occurs 10-12 days of flowering (Table 1).

The diurnal dynamics of the flowering of *Th.vulgaris* L. in the third year of vegetation (2016y.) of plants was studied (Table 2). For this, the number of blossoming flowers in each bush was counted.

At the beginning of flowering, when the dynamics of daily flowering is observed, at 5⁰⁰ o'clock in the morning the air temperature is +8⁰C, the relative humidity air is 56%, not a single flower has blossomed on the plant. At 7⁰⁰ o'clock the temperature is +10⁰C, the relative

air humidity is 55%, the plant has 28 flowers, at 9⁰⁰ o'clock the air temperature is +11⁰C, the relative air humidity is 51%, 96 flowers, at 11⁰⁰ the air temperature is +15⁰C, the relative air humidity is 48%, 68 flowers at 13⁰⁰ the air temperature is +18⁰C, the relative air humidity is 46%, 16 flowers have blossomed. The rest of the time, the flowers did not bloom, and during the day 208 flowers bloomed on one plant.

During the period of massive flowering, 143 flowers bloomed at 6⁰⁰-7⁰⁰ o'clock in the morning at an air temperature of +13⁰C, a relative humidity of 53%. At 9⁰⁰ o'clock the air temperature was +18⁰C, relative humidity air 48%, 528 flowers, at 11⁰⁰ the air temperature was +23⁰C, relative humidity air 41%, 231 flowers, at 13⁰⁰ the air temperature was +25⁰C, the relative air humidity 37%, blooming of 44 flowers was observed, while the flowers did not bloom until the end of the day. During the period of massive flowering, 957 flowers bloomed on one plant during the day.

The end of flowering period of *Th.vulgaris* L. lasts longer and lasts 30-40 days. The end of flowering during the day from 5⁰⁰ to 13⁰⁰, a total of 16 flower openings were observed. The most open flower was at 9⁰⁰ hours. At this time, the air temperature was +22⁰C, relative humidity air 46%.

In our study, it was observed that a day of blossoming flowers lasts from 7⁰⁰ to 13⁰⁰ hours. An oblique opening of flowers that blossomed on the same day was observed at the beginning of flowering, both during mass flowering and at the end of flowering, from 8⁰⁰ to 11⁰⁰ hours, and the flowering process peaked at 9⁰⁰ hours (Figure 2; Table 2).

Table 1 - Phenology of flowering *Th.vulgaris* L. in the conditions of the Karshi oasis, (n=10)

Observed years	Budding	Flowering period			
		beginning of flowering	mass flowering	end of flowering	duration (days)
2015	18.03	31.03-9.04	12.04-12.05	14.05-20.06	82
2016	22.03	4.04-12.04	15.04-12.05	16.05-26.06	84
2017	24.03	3.04-10.04	12.04-14.05	16.05-19.06	78

Table 2 - Diurnal flowering dynamics *Th.vulgaris* L. (2016 y.)

Flowering	Opened	Observed hours	In a
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period	flowers	5 ⁰⁰	7 ⁰⁰	9 ⁰⁰	11 ⁰⁰	13 ⁰⁰	15 ⁰⁰	17 ⁰⁰	19 ⁰⁰	day
Beginning 10.04.2016	number	–	28	96	68	16	–	–	–	208
	%		13,5	46,1	32,7	7,7				100
Mass 25.04.2016	number	–	143	528	231	44	–	–	–	957
	%		15,1	55,8	24,4	4,7				100
End 15.06.2016	number	2	4	8	2	–	–	–	–	16
	%	12,5	25	50	12,5					100

Conclusion

Thus, according to the results of our observations, in the conditions of the Karshi oasis, generative organs were formed from the first year of the growing season of *Th.vulgaris* L.. The flowers of *vulgaris* belong to the group of plants that bloom during the day. In one plant, at the beginning of flowering, up to 208 flowers bloom during the day, up to 957 in mass flowering and up to 16 at the end of flowering. Flowers bloom in large numbers between 8⁰⁰ and 11⁰⁰ hours (air temperature +15+20⁰C, relative humidity air 45-50%), and at 9⁰⁰ hours flowering reaches its peak.

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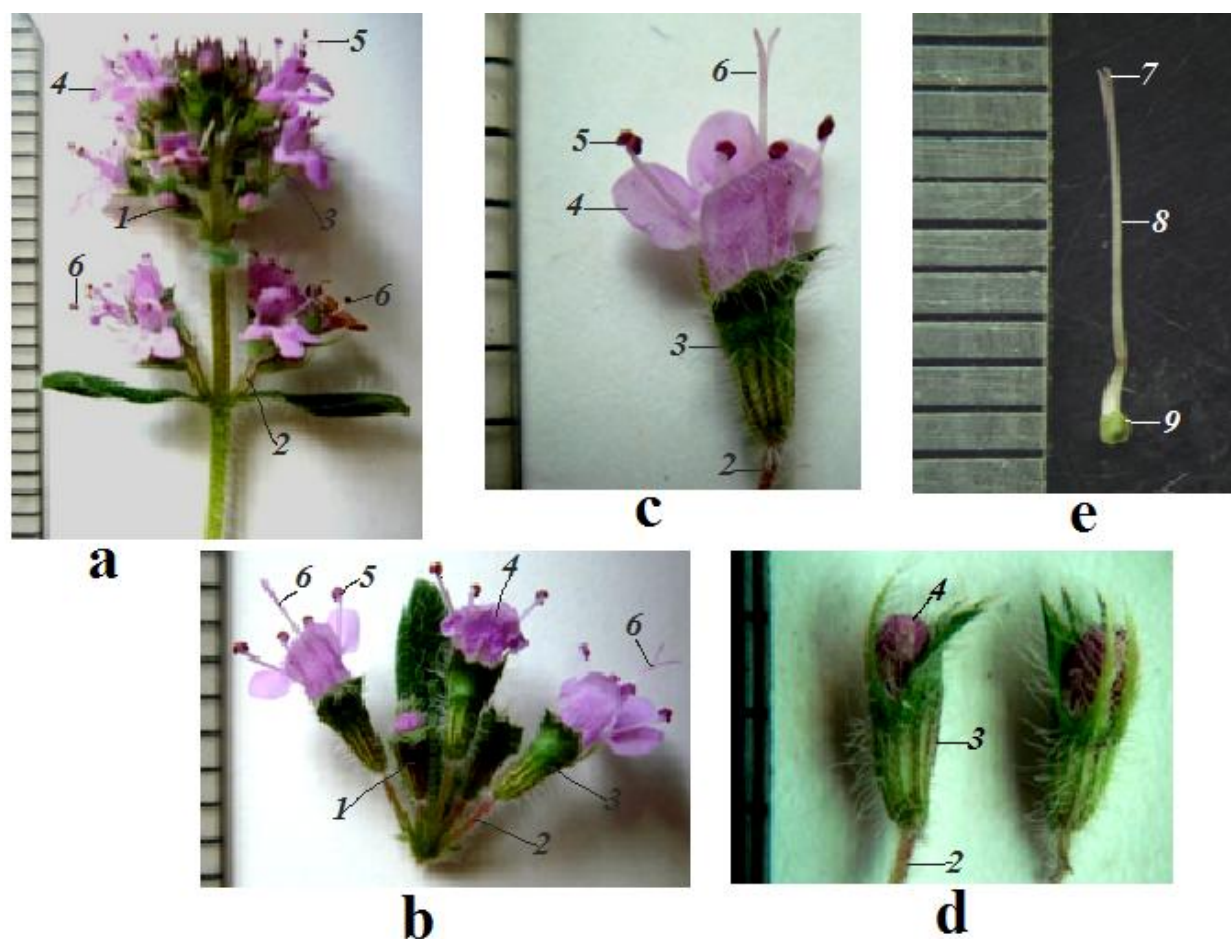


Figure 1 - Inflorescence and flower *Th.vulgaris* L.: a – fragment of spike inflorescence; b – fragment of small inflorescence on the whorl of the inflorescence; c – fragments of flowers; d – bud; e – fragment of pistil; 1-bud; 2-peduncle; 3- calyx; 4-corolla; 5-pistil; 6-stamen; 7-stigma; 8-column; 9-ovary.

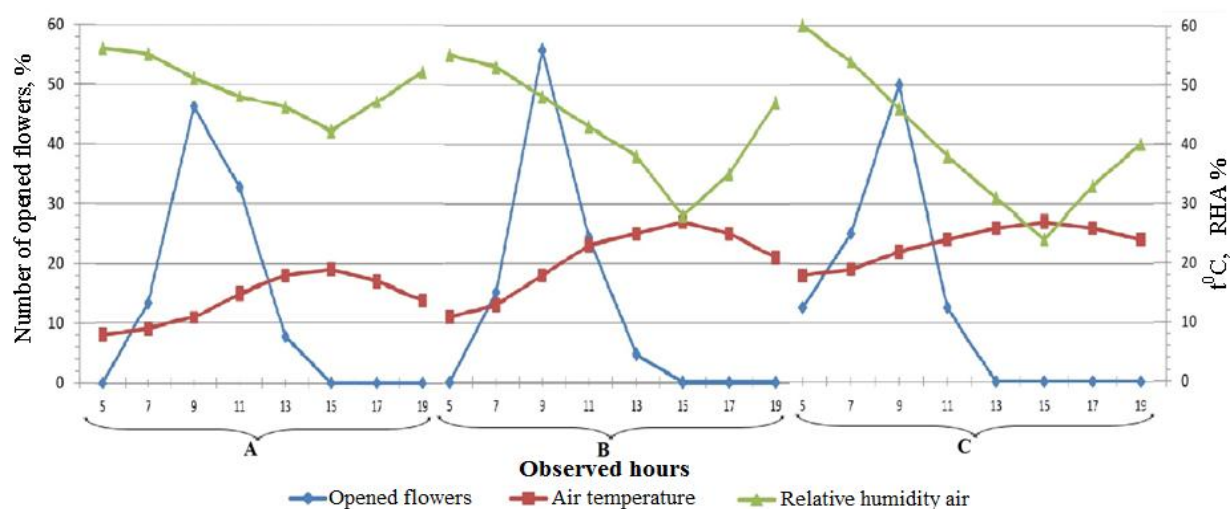


Figure 2 - Diurnal flowering dynamics *Th.vulgaris* L.: A – beginning of flowering; B – mass flowering; C – end of flowering.