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Flower Biology Of Lagochilus Gypsaceus Under The Conditions Of The Nuratin Ridge

Akhmedov A.K. , Nomozova Z.B. , Hasanov M.A. , Rasulova Z.A.

Samarkand State University, Department of Botany.

Annotation. It was studied a biology of flowering of species of L. gypsaceus in the two coenopopulations in Nuratau mountains conditions. Obtained results showed, that daily flowering of this species were occuried at the air temperature 26-27^{0}C and relative humidity of 28,5-31,5%. Seasonal flowering occureid during June, July and continued for 28-30 days.

Keywords: endemic, Lagochilus, Lamiaceae, the beginning of the vegetation, process, thyrsus, zygomorphous, dichasium, flowering rhythm, daily, seasonal, temperature, relative humidity.

Introduction: Lamiaceae family has essential oils that are used in the medical, pharmaceutical, cosmetics, and food industries [1]. On the globe, the genus Lagochilus Bunge is represented by 76 species (www.theplantlist.org) [11]. In the flora of Uzbekistan, representatives of this genus are 13 species. T.I. Tsukervanik , when processing the genus Lagochilus in the “Key Plants of Central Asia” for the region, lists 33 species, while Lagochilus intermedius Vved., Previously listed in the flora of Uzbekistan, was synonymous. On the other hand, in this compendium, the author for 16 species out of 33 provides information about their growth on the territory of Uzbekistan. During a critical examination of the materials stored in the herbarium of the Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan, employees of the Central Herbarium supplemented the list of species of this genus for the flora of Uzbekistan with 2 more species - Lagochilus diacanthophyllus (Pall.) Benth. and Lagochilus platyacanthus Rupr. Thus, the number of species of the genus Lagochilus growing on the territory of Uzbekistan today is 18. Of these, 4 species (Lagochilus vvedenskyi, L. olgae, L. proskorjakovii, L. inebrians) are included in The Red Data Book of the Republic Uzbekistan [9]. The main population of all these species grow in Nuratau and Kyzylkum.

The practical use of plant resources should be based on scientifically based forecasts of species stability in cenoses, which in turn leads to the conservation and resumption of natural plant populations. This requires in-depth knowledge about the population life of the species. Assessment of the state of resources should be based on a study of the ecological-coenotic and reproductive characteristics of species: territorial distribution and frequency of occurrence, abundance, density, population structure, productivity, etc. In addition, population-based studies allow for price-based diagnostics of processes in vegetation and are one of the important components of modern ecological forecasting of ecosystem behavior.

Species of the genus lagochilus have a wider ecological range. On the territory of Uzbekistan, lagochilus is found in almost all vertical zones, with the exception of highlands. Most species grow in arid zones, which include the species of lagochilus, L. gypsaceus, studied by us this year.

L. gypsaceus grows on rocky - gravelly slopes of outlier peas in the plain, at the outcrops of variegated rocks in the foothills. It is found in Kyzylkum, Karnabchul, Surkhan-Sherabad valley, in the ranges of Nuratau, Gissar, Babatag and Kugitanga [2].

Research methods. In 2013–2016 We studied the flowering characteristics of L. gypsaceus in vivo. The study of the daily flowering rhythm was carried out on model plants (10 copies of each species) according to the methods of A.A. Kazakova [3] and A.N. Ponomareva [4].

Results and its discussion. Lagochilus flowers are zygomorphic, bisexual, with a double perianth. The calyx is usually narrow-bell-shaped, sometimes with a spike-shaped limb, almost five-nerve, with 4-5 teeth ending in spines. Corolla with a barely protruding tube, provided with a hairy ring inside, outside covered with hairs facing down; corolla omitted by various trichomes. The edges of the lobes are densely planted with long thin-walled 2-7 cell hairs.

Stamens in flower 4, they are arranged in two circles. Nectary 4, light yellow in shape resemble a disk. They are located at the bottom of the ovary and have four lobes. On the surface of the nectary, essential oil glands and trichomic formations develop. Nectar is allocated from 7 to 11 hours, as well as from 18 to 20 hours. During the flowering period, wild bees (Apis melifera L., Crosica offinis Mor.) And other insects abundantly visit the species of rabbit from 6 a.m.

In L. gypsaceus, flowers are sessile 4-6 in the axils of the upper leaves. Bracts are relatively thin, horizontally deflected, almost triangular, needle-shaped, bulging, fluffy, prickly, bare at the end. Calyx narrowly bell-shaped, with a wide bell-shaped limb, m. bent, with an almost straight pharynx, short-haired, with an admixture of longer hairs on the tube, with triangular, almost horizontally or horizontally spread, sometimes backward deflected, ending with barbed teeth, about 2 times shorter than the tube; in L. gypsaceus, the corolla is white or pinkish, with brownish veins, 20–25 mm long, with a tube barely protruding from the calyx tube; upper lip with long straight hairs. Nuts L. gypsaceus glabrous, 4-5 mm long.

According to the classification, Troll [5], the flowers of lagochilus can be attributed to closed thyroid inflorescences and open thyristian inflorescences.

The flowers are protogenic. The blades of the stigma of the pistil, which were upright two to three days before opening the anthers, begin to deviate from each other and take a horizontal position. The minimum life span of a stigma is 26–30 hours, and the maximum is 48–72 hours, as can be seen from the change in stigma color. If the ovary is fertilized, the color of the stigma changes after 24–48 hours, and in the ovary of the remaining unfertilized, the color changes only after 3-4 days.

The duration of flowering of one flower is 2-3 days. In the first days of flowering, the flower opening is less intense, mass flowering occurs on the 10th day, reaching 50% (the number of flowers opened of the total number), then the number of opened flowers decreases.

The blooming of flowers begins with the raising of the limb of the upper lip, after which the lower lip opens. When the corolla is opened from under the petal, the first pair of stamens appears. Disclosure of anthers of the first pair of stamens occurs 3-4 hours after opening of the corolla in the daytime. Anthers of the second pair of stamens located below the first pair open at 11 o'clock.

Fig.1. General view of Lagochilus gypsaceus in the herb-wormwood community.

Blossoming of flowers begins at 2 a.m. In the period from 4 to 6 hours there is a massive disclosure of flowers. Therefore, the flowers should be classified as night-opening flowers. The maximum number of flowers is revealed at an air temperature of 18–27.00 and a relative humidity of 25.7–35.2%. Flowering of one bush of L. gypsaceus continues under natural conditions for 28–30 days.

Flowers bloom in acropetal inflorescences. The first flowers to be opened are located in whorls in the lower part of the main axis of the shoot. In the early days of flowering, a small number of flowers are revealed on the main monocyclic shoot. Massive blooming of flowers occurs on the 10th day from the moment of flowering. Intensive blooming of flowers in the main axis of the shoot continues mainly for 20-22 days, and then there is a decline. On 30-31 days from the beginning of flowering, no more than 1.5% of the total number of flowers in the main shoot blooms during the day.

Flowering of lateral shoots starts from the lower node of the whorls of the lowest shoot, and then spreads upward and to the shoots of the upper tier. This occurs on the 15th day after the beginning of flowering and lasts, depending on meteorological conditions, for 40 days.

Observations of the blooming of flowers showed that, depending on weather conditions, all the flowers on one shoot open in 10 days, and on one plant in 30 days.

In addition, parts of the L. gypsaceus flower were measured: calyx width, corolla length, anther length, anther width (табл. 1).

Table 1 Biometric indicators of the flower of L. gypsaceus (in mm.)

Flower parts	M ± m
Cup length	1,28±0,06
Cup width	1,12±0,04
Corolla Length	2,3±0,08
Filament Length: a) lower stamens b) upper stamens	 1,59±0,10 1,81±0,12

Anther Length (μm)	105
Anther Width (μm)	74

Flowering rhythm. It is known that the blooming and pollination of flowers of various plants occurs in accordance with a certain daily rhythm, and the main influencing factor that has a significant effect is temperature and light during the day. [6, 7, 8, 9].

The daily rhythm of the blooming of flowers, characteristic of entomophiles, is in clear connection with the daily dynamics of the summer activity of their pollinators.

Under natural conditions, the features of the daily rhythm of flowering and pollination of L. gypsaceus have not been studied. In this regard, we have studied the features of the diurnal course of the blooming of flowers of the species studied by us.

Seasonal flowering of L. gypsaceus was observed in 2 CP. The first CP is located in the Kokchatau association of the old village (N 40°54' 341'' E 064°99.773'' H=307 m.a.s.l.), second CP in the Kokchatau Ukluksai association (N 40°49.831' E 065°14.377' H=365 m.a.s.l.) (tabl. 2).

Table 2 Duration of seasonal flowering of L. gypsaceus

CP Name	Geographic location	Start of vegetation	Flowering process			Flowering time days
			start	Massive	ending	
Kokchatau old village	N 40°54' 341'' E 064°99.773'' H=307 m.a.s.l.	15.02	23.05	5.06	20.06	28
Kokchatau Ukluksai	N 40°49.831' E 065°14.377' H=365 m.a.s.l.	20.02	30.05	12.06	30.06	30

CP Kokchatau old village flowering began on May 23, and CP Kokchatau Ukluksai on May 30, the flowering time was 28-30 days. Flowering of L. gypsaceus started after 200 at night. At Relative humidity-35.5%, air temperature 22.5 °C 2 flowers opened, then 400 hours Relative humidity -31.6%, air temperature 26°C - 5 flowers, at 6 o'clock Relative humidity -28.5%, air temperature 27 °C - 8 flowers (fig. 2).

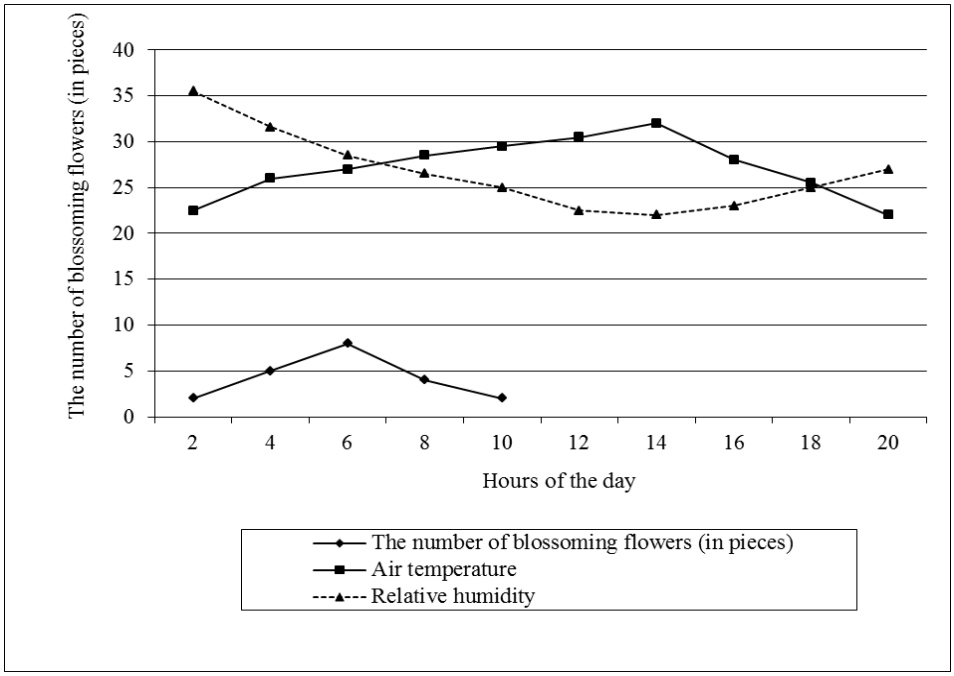

Fig.2. The daily flowering rhythm of L. gypsaceus

Conclusions. Thus, the flowers of L. gypsaceus are zygomorphic, bisexual, with a double perianth. The calyx is usually narrow-bell-shaped, sometimes with a spike-shaped limb, with 4–5 teeth ending in spines. Corolla with a barely protruding tube, provided with a hairy ring inside, outside covered with hairs facing down; corolla omitted by various trichomes. Stamens in flower 4, they are arranged in two circles.

The duration of flowering of one flower is 2-3 days. L. gypsaceus flowers are a type of nighttime drop-down. The best conditions for opening the flowers of L. gypsaceus is air temperature 26-27°C and relative humidity 28.5-31.5%. The duration of flowering of L. gypsaceus is 28-30 days.

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