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The Ontogenetic Structure and Coenopopulation of *Lagochilus Vvedenskyi* (*Lamiaceae*) in Kyzylkum Desert (Uzbekistan)

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Abstract: ***Ineffective use of plant resources for human welfare has resulted in the loss of plant biodiversity worldwide. In parallel the number of endangered species has increased. The same developments have affected the flora of Uzbekistan, with the number of Red List plant species having almost doubled in the last 30 years: from 163 to 1984 to 324 at present. Species from the genus Lagochilus belong to the most vulnerable plant species from the Lamiaceae family. Out of existing 13 Lagochilus species in the flora of Uzbekistan, four are included in the Red Book of the Republic of Uzbekistan: Lagochilusvvedenskyi, L.olgae, L. proskorjakoviiand L. inebrians(Red Book of Uzbekistan, 2009). On the basis of occurrence, these Red List plant species belong to category I (disappearing) and II (rare species). In addition, the natural distribution of other species from this genus, such as Lagochilus gypsaceus and Lagochilus acutilobus are also limited across the country.***

Keywords: *Lagochilus vvedenskyi,* Plant community, Ontogenetic structure, Mature, Coenopopulation types

1. Introduction

Species of the genus *Lagochilus* have a potentially high economic value. The leaves and flowers of the plant are widely used as medicinal raw material. The leaves contain alcohols, lagochilin (0.6-2%), essential oils (0.03%) and vitamin K. The majority of the genus' members contain narcotic, hemostatic, and other substances (Pratov et al., 2006).

At present, populations of *Lagochilus* species are highly affected by the influence of various natural and anthropogenic factors and, as a result, strong reductions of the natural habitats of these species have been observed (Beshko, 1997; Shomurodov et al., 2014). The reduction of the natural habitats of *Lagochilus* species dictates undertaking of detailed and in-depth ecological studies of these plants in order to develop better, science-based and practical measures for their conservation and restoration.*L. vvedenskyi*was growing in Kuldjuktau.

Kuldjuktau is represented by a low elevation mountain range and is located in the South-West part of Kyzylkum desert. The average elevation is 520-560 m a.s.l, but highest the point reaches 850 m. The climate of the area is quite identical to other desert zones of Uzbekistan which are characterized by low annual rainfall (60 mm) and high air temperature (average 31°C and maximum temperature 46°C). Soil cover are represented by diverse types, but the prevailing ones are grey-brown with different levels of salinization.

L. vvedenskyi(family *Lamiaceae* Lindl.) - semi-shrub height of 20-25 cm, leaves opposite, broadly, with prominent veins, pubescent with simple hairs transparent. Stem white, pubescent with simple hairs. The flowers are whitish-pink length of 25-28 mm, 2-4 in the axils of upper leaves. Calyx campanulate, ends with prickly thorns. Flowering in June, fruiting in July-August (Vvedensky, 1961). Narrow local endemic residual outcrops Kyzylkum. Introduced in the Red Book of the Republic of Uzbekistan with the status 2 (Shomurodov, 2009).

The main purpose of the current work is to study the ontogenetic structure of*L. vvedenskyi,*identification of coenopopulation types in natural conditionson remained low mountains of Kyzylkum desert.

2. Materials and Methods

The ontogeny of the type described in the composition of ephemeral-wormwood community Sultonbibi district in the central part Kuldjuktau. The description used to describe the concept of discrete ontogenesis (Rabotnov, 1950 Uranov 1975; coenopopulation Plant, 1976; 1988). Structure of populations studied by transect. Transects 10 m long laid along the slope, they were divided into for 1m2 area. Each coenopopulations laid from 10 to 15 sites over $1m^2$. In characterizing the population structure based on the representation of typical ontogenetic spectrum (Zaugolnova, 1994). Building a developmental spectrum conducted by the usual method (Cenopopulations Plant, 1976). Cenopopulations characterized classifications of Uranov and Smirnova (1969) and "delta-omega" (Zhivotovsky, 2001). Geobotanical descriptions are made by standard methods at the sites of 100 m (geobotany Field, 1972).

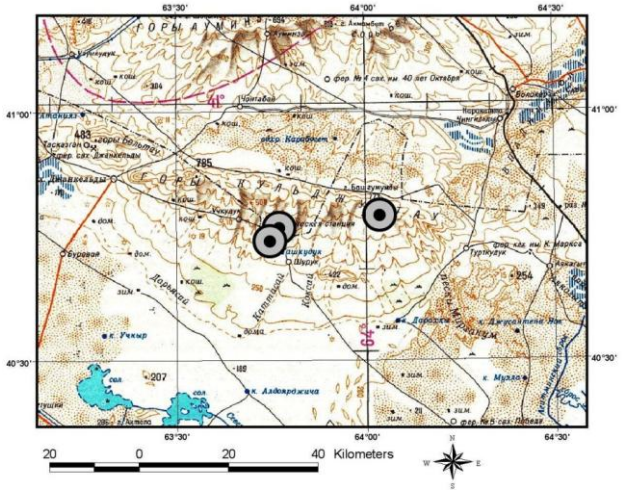


Figure 1: Black cycles on the map showing the location of study areas of *L. vvedenskyi*in Kyzylkum.

The structure of coenopopulation (CP) of *L. vvedenskyi* was studied in petrophytic and gravelly grey-brown soils. The first coenopopulation of *L. vvedenskyi* occurs in semi shrub plant community composed of mostly of *Artemisiadiffusa, Artemisiaturanica, Poa bulbosa,* and*Carex physodes*; the second CP occurred in a plant community with a mix of different semi shrub and perennial grass species including *Artemisiadiffusa, Artemisiaturanica,Salsola arbuscula, Scorsonera gageoides, Ferula foetida,* and *Alhagi pseudalhagi*; and the third CP in ephemeral-semi shrub community with *Artemisiadiffusa, Ferula foetida, Tulipa lehmaniana, Delphinium camptocarpum,* and *Roemeria hybrida*.
Total projective cover of vagetation from 10 to 20%. Brief description of the studied coenopopulation was given in the Table. 1.

Table 1: Characteristics of the studied coenopopulation of L. vvedenskyi in Kyzylkum

№ CP	Geographical coordinates/ Elevation/m	Community/ dominant species	Total projective cover of vegetation, %	The projective cover of this species,%
1	N 40°45′885″ E063°46′341″ Elevation =441	*Artemisia diffusa, Artemisia turanica, Poa bulbosa, Carex physodes*	15-20	≤1
2	N 40°44′346″ E0 66°95′246″ Elevation =595	*Artemisia diffusa, Artemisia turanica, Salsola arbuscula, Scorzonera gageoides, Ferula foetida, Alhagi pseudalhagi*	10-15	≤1
3	N 40°47′395″ E0 64°02′248″ Elevation =593	*Artemisia diffusa, Ferula foetida, Tulipa lehmaniana, Delphinium camptocarpum, Roemeria hybrid*	10-12	≤1

3. Results and Discussion

Germination of *L. vvedenskyi* overhead. Seedling (**p**) –one stem of plants with two cotyledons. Leaf blade edge with a winding and is obovate. Its length of 0.2-0.3 cm and 0.1-0.3 cm width. The duration of the state of a few weeks.

The juvenile (**j**) state of the plant goes into seed germination year after drying cotyledons. Juvenile one stems are monopodially growing plants.On the long shoots are formed of 2-3 pairs of leaves on long stalks. The duration of the state of 1-3 years. The immature (**im**) status of individuals pass, as a rule, for the next year. Apical buds start to grow, growing monopodially. Branching individuals is due to the deployment of the upper lateral buds on the situation on the annual growth of the previous year. At the end of the growing shoots aboveground part dies, and the basal part of a buds due to unrealized contractile activity of the main root is pulled into the ground: begins to form caudex. In the 4-5 year plants become the virginal (**V**) the ontogenetic state. Branches of plants. Buds renewal among metamers 2-4 are located on the female part of the shoot. Caudex reaches 1.2-2.3 cm and 0.4-0.7 cm thickness. The main root thickens. The duration of the state of not more than 3 years. Young generative (**g1**) of individuals in the bush increases the number of shoots. The bush is from 1-2 and 1-5 generative vegetative shoots. In 6-8 years the plants go into middle-generative (**g2**) state. In this state, the elongated shaped dicyclic generative shoots. Duration of mature generative state 8-10 years. Older generative plants (**g3**) are made up of 2-4 generative long shoots. Perennial of the caudex destroyed. Individuals senile condition (**s**) are formed by 1-2 elongated shoots, turning from dormant buds preserved in living areas caudex.

Figure 2: General view of *L. vvedenskyi*at the middle generative ontogenetic stage

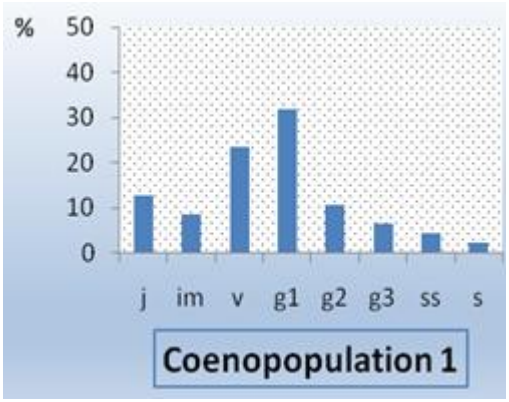
The ontogeny of individuals *L. vvedenskyi* full, lasts 22-33 years, the longest period - generative (14-20 years). The typical range of developmental *L. vvedenskyi* centered, it is determined by: the seed of self-maintenance way coenopopulation, has lived weak shoots, the rapid pace of development in individuals pre-generative (5-8 years), at generative (2-4 years) and long course of development of the average generative state by lignification caudex. Centered

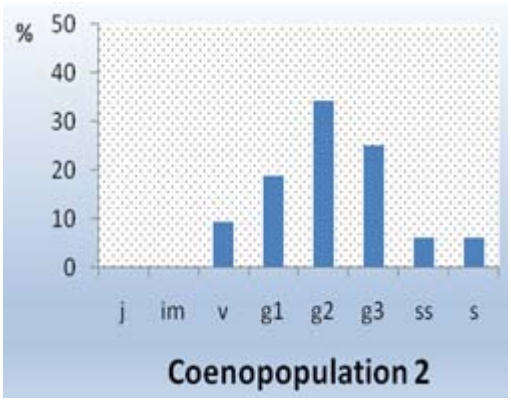
spectra, according to the of Zaugolnova (1994), formed in caudex herbaceous of plants with high life expectancy of individuals in middle-ontogenetic state, the lower their elimination is difficult and seed germination.

According to the classification by Uranov and Smirnova (1969) studied, coenopopulations of *L. vvedenskyi* normal, but are not complete, with the exception of the CP 1. Developmental spectra specific CP of *L. vvedenskyi*comprise the following types of spectra: centralized (2 and 3CP) and left-hand (1 CP) (Figure 3.). In coenopopulations with centered spectrum (2and 3CP) peaks in middle-generative individuals, due to the long duration of ontogenetic state (Figure 3).

Assessment of age (Δ-delta) and efficiency (□-omega) coenopopulation showed that the1stCP young: a large proportion of the generative (48.89%) and a significant - pre-generative individuals (44.68%), the 2nd CP mature but approaching the aging (Δ = 0,55; □ = 0,78). It is an accumulation of old individuals generative state (25.0%). The 3rd CPmature (Δ = 0,52; □ = 0,84), in this coenopopulations dominate individual generative period but is represented by early senescent stage in this coenopopulation (g = 90,62%). (Figure 4).

Research coenopopulation of species in different ecological and coenotic conditions showed that the optimum environmental conditions for the growth of individuals *L. vvedenskyi*are gravelly gray-brown soils (2 and 3CP). The absence of the 2and 3 CP at the time of the study young individuals associated with the most noticeable anthropogenic pressure on the vegetation cover (mining work, overgrazing).





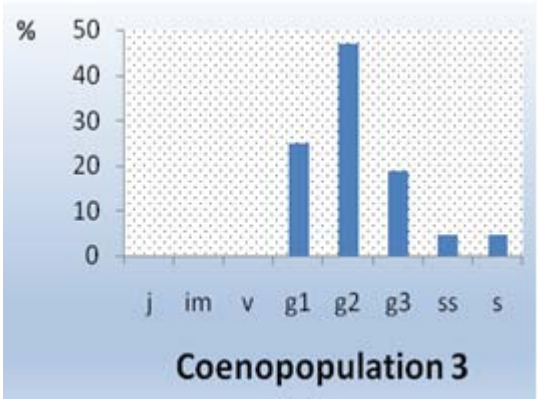


Figure 3: Developmental coenopopulations spectrum of *L.vvedenskyi*Note: *x-axes - developmental state; y-axes - distribution of individuals on developmental states in %*

Table 2: Demographic characteristics coenopopulations of *L. vvedenskyi*

№ CP	Δ	φ	The average density of individuals/m^2	Type CP
1	0,27	0,55	0,47	Young
2	0,55	0,78	0,30	Mature
3	0,52	0,84	0,64	Mature by (senescent)

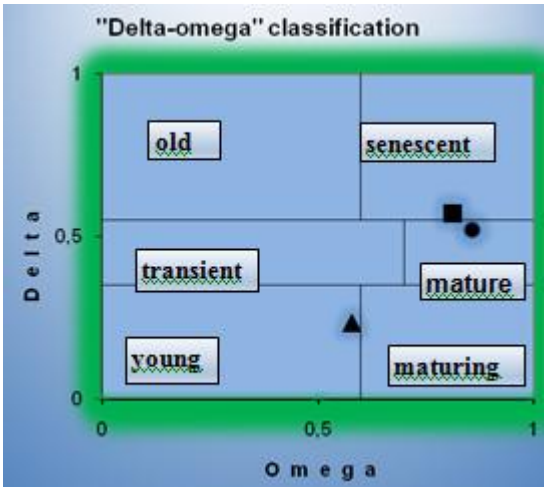


Figure 4: Coenopopulation types of *L.vvedenskyi*
Note: Δ - age population index, □ - efficiency index. The 1st CP young(▲), the 2nd CP mature (●), the 3rd CP mature (by senescent) (■)

4. Conclusion

Thus, in conditions of Kyzylkum duration of ontogeny of individuals *L. vvedenskyi* it is 22-33 years. Cenopopulations this kind of normal, but are not complete, except for the 1st CP. Optimal growing conditions for the kind of individuals are the first coenopopulation of *L. vvedenskyi* occurs in semi shrub plant community composed of mostly of *Artemisiadiffusa, Artemisiaturanica, Poa bulbosa,* and*Carex physodes* communities in which real-centered developmental spectrum corresponds to the characteristic. It was found that the structure of coenopopulation significantly affected by anthropogenic effects, such as overgrazing, which leads to a lack of young individuals in populations.

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