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**ONTOGENETIC CHARACTERISTICS AND COENOPOPULATION STATUS
OF THE RARE AND ENDANGERED SPECIES *Listera ovata* (L.) R. Br.
IN THE NORTHEASTERN PART OF THE LESSER CAUCASUS**

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**ОНТОГЕНЕТИЧЕСКАЯ ХАРАКТЕРИСТИКА И ЦЕНОПОПУЛЯЦИОННЫЙ СТАТУС
РЕДКОГО И ИСЧЕЗАЮЩЕГО ВИДА *Listera ovata* (L.) R. Br.
В СЕВЕРО-ВОСТОЧНОЙ ЧАСТИ МАЛОГО КАВКАЗА**

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Abstract. For the first time, ontogenetic characteristics and coenopopulation status of a rare and endangered species of early spring flora *Listera ovata* (L.) R. Br. are presented. The growing area of this species in the northeastern part of the Lesser Caucasus near the village of Ashagi Dashkesan, Dashkesan district and Tovuz district, Esrik Jirdakhan, has been studied. Information about two populations of the species is provided and a comparative analysis is carried out. The largest number of individuals and average density were noted in CP 1, the smallest in CP 2. The restoration index and replacement index have the highest values in CP 2. According to the Δ and ω indicators, both coenopopulations belong to the adult type.

Аннотация. Впервые представлены онтогенетическая характеристика и ценопопуляционный статус редкого и исчезающего вида ранневесенней флоры *Listera ovata* (L.) R. Br. Изучены районы произрастания этого вида в северо-восточной части Малого Кавказа: около села Ашаги Дашкесан Дашкесанского района и Есрик Джирдахан Товузского района. Даны сведения о двух популяциях вида и проведен сравнительный анализ. Наибольшее число особей и средняя плотность отмечены в ЦП 1, наименьшее — в ЦП 2. Наибольшее значение индекса восстановления и индекса замещения имеют в ЦП 2. По показателям Δ и ω обе ценопопуляции относятся к «взрослому» типу.

Ключевые слова: редкие виды, орхидные, тайник яйцевидный, Малый Кавказ, популяции, растительные сообщества.

Keywords: rare species, Orchidaceae, *Listera ovata*, Lesser Caucasus, population, plant communities.

In the changing conditions of the biosphere, there is a decrease in the natural areas of rare plant species, including representatives of the Orchidaceae family. As a rule, orchids are represented by small populations limited to certain ecological holes and characterized by poor competitiveness [1, 5].

For this purpose, we have studied the ontogenetic characteristics of some rare and endangered

species distributed in the northeastern part of the Lesser Caucasus, studied the state of their coenopopulations, and determined their ontogenetic and demographic structure. The species *Listera ovata* (L.) R. Br. was chosen as the research object.

Listera ovata (L.) R. Br. (oval hidden flower) is a short-rooted perennial herb, a mesophilic, facultative calcephilous species. The trunk is 25-40, sometimes 60 cm long. The lower part is slightly thickened, and it has 2 broad-oval leaves in the middle. The flower cluster is brush-shaped, wide and long. Underline of flower is egg shaped, sticky-hairy and short than under part of flower. The flowers are yellowish-green. The lip is yellowish, 10 mm long [4] (Figure 1).

Pollination takes place through insects. In addition to seed propagation, vegetative propagation is also possible [3]. During seed germination and in the first years of development, the plant needs contact with the fungus. This species can live in both rich and infertile soils. Although it mainly prefers shady places, it can also grow in open areas [2]. Its range covers the whole of Europe, reaches Asia and Eastern Siberia [3]. In Azerbaijan, it spreads in the Guba area of the Greater Caucasus, the west of the Greater Caucasus, the north and center of the Lesser Caucasus, the Lankaran lowland, and the Lankaran highlands in the areas of the middle mountain belt [5].



Figure 1. *Listera ovata* (L.) R. Br. the plant in nature

Juvenile (j) individuals — have 2 developed leaves, one slightly different in size and shape from the other. Thus, 1 leaf is larger and egg-shaped, and the other one is narrower and sharper shaped. The length of the leaf is up to 4.5-5 cm, and the width is up to 2-3 cm. The number of veins in the leaf varies from 5 to 7. The root is short, thick-shaped, the number of additional roots is 7-8. The height of the individual is up to 8-10 cm.

Immature individuals (im) — differ in height from juvenile individuals, as they are taller and have larger leaves. The lower leaf is round-egg-shaped, 6-7 cm long and 4-5 cm wide. The upper leaf is oval-egg-shaped, sharper, up to 9-10 cm long and 4.4-5 cm wide. The number of veins is up

to 4-5. Its height is 14-15 cm. The root is short, thick, and the number of additional roots reaches 10-12.

Virginal individuals (v) — differ from immature individuals in that their stems are slightly thicker, and their leaves are larger. The length of the leaf is 10-13 cm, and the width is up to 8 cm. The number of veins increases to 8-9. The height of the individual increases to 20-25 cm.

Young generative individuals (G1) — differ from other individuals by the presence of a flower axis. The length of the flower axis varies greatly among individuals. The trunk is already wider and thicker. The leaves are wide-ovate, the tip is slightly narrower. Its length is up to 8-11 cm, and its width is 6-8 cm. The number of wide veins in the leaf is 7-8. The length of the flower axis can increase from 5 cm to 20-25 cm.

Medium generative individuals (G2) — reach the high limit of development, differ in the size of all organs. Its leaves are wide-ovate in shape, length is 15-16 cm, and width varies up to 8-11 cm. The number of veins in the leaf varies from 8 to 10. The total height of the individual increases to 60-70 cm.

Older generative individuals (G3) — differ mainly in the thickness of the body and the height of the neck. The leaves are larger and have an oval-egg shape. It is 17-18 cm long and 10-12 cm wide. The number of veins in the leaf varies from 10 to 12. The total height of the individual is up to 70-80 cm. The rhizome has a thick dark brown color, the number of additional roots reaches 25-30.

Senile individuals (s) are distinguished by their small size and, most importantly, their color. So, they have light green, sometimes yellowish colored leaves. Leaves are 6-8 cm long and up to 5 cm wide. The rhizome is shortened, thin and has many additional roots.

First coenopopulation of *Listera ovata* species (CP 1) — It was studied in the forest massif at an altitude of 1325 m in Ashagi Dashkesan village, Dashkesan district. The soil is dark brown and moist. The slope of the area is 30. The projective plant cover is 40-50%. Here, individuals of the species are found in groups, separated from each other. Approximately 2-3 individuals are found in 1 m² area.

Fagus orientalis Lipsky, *Carpinus betulus* L., *Acer campestre* L., *Fraxinus excelsior* L. species were found in the Cenozoic. Together with this plant in the plant cover, *Hedera herbacea*, *Calystegia silvatica* (Kit.) Griseb., *Primula woronowii* Losinsk., *Alliaria petiolata* (M. Bieb.) Cavara & Grande, *Vicia narbonensis* L., *Cruciata laevipes* Opiz, *Viola odorata* L., *Scilla siberica* Andrews, *Corydalis angustifolia* (M. Bieb.) DC., *C. marschalliana* (Willd.) Pers., *Orchis purpurea* Huds., *Platanthera chlorantha* (Custer) Rchb. species were present.

CP 2 — It was discovered in an open forest at an altitude of 764 m above sea level around the village of Esrik Jirdakhan, Tovuz region. The soil is brown and has little moisture. The projective cover of grass plants was 60-70%. Approximately 1-2 individuals are found in 1 m² area. *Fagus orientalis*, *Carpinus betulus*, *Mespilus germanica* from trees, *Crataegus monogyna* Jacq., *Rubus* sp., *Pyracantha coccinea* from shrubs. In the grass layer, *Primula woronowii*, *Viola odorata*, *Artemisia absinthium*, *Plantago major*, *P. lanceolata*, *Prunella vulgaris*, *Trifolium pratense*, *Potentilla repens*, *Sanguisorba officinalis* L., *Hypericum perforatum* L., *Echium rubrum* Forssk., *Geum urbanum* L., *Achillea millefolium* L. types are common.

The ontogenetic spectrum is depicted in the form of a diagram with age groups (Figure 2).

In the studied 2 coenopopulations, the percentage of pregenerative individuals was 51-32%, 38-64% of generative individuals, and 9-5% of postgenerative individuals, respectively (Figure 2).

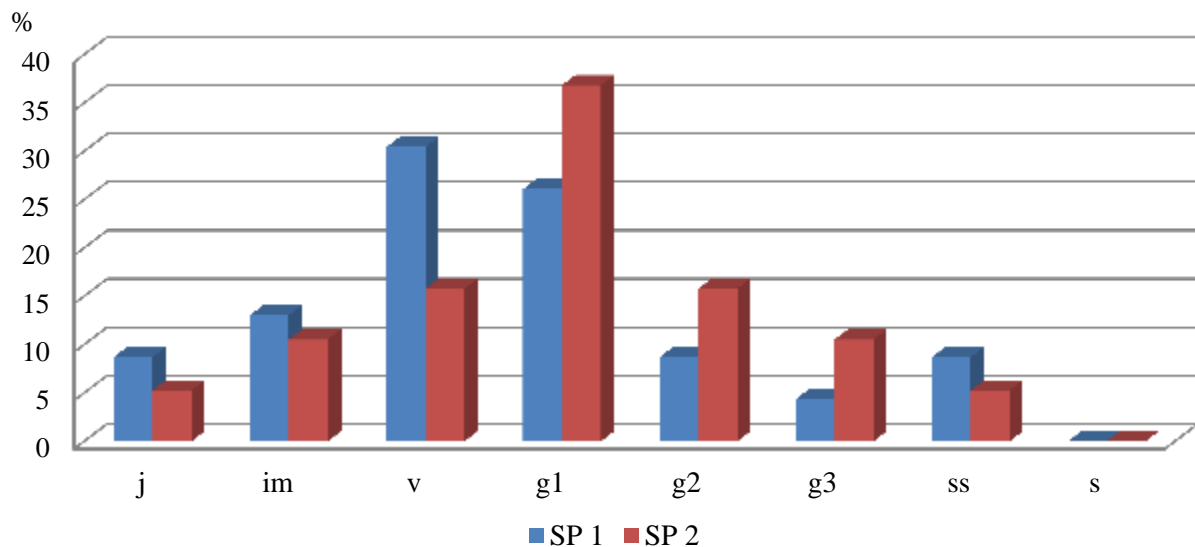


Figure 2. Ontogenetic spectrum of *Listera ovata* (L.) R. Br. coenopopulations

Demographic values of coenopopulations of *Listera ovata* plant are shown in Table.

Table

DEMOGRAPHIC INDICATORS
 OF COENOPOPULATIONS OF THE PLANT *Listera ovata* (L.) R. Br.

| No | n | Xa | Iq | Ib | Ie | Δ | ω | Type |
|------|----|-----|-------|-------|----|----------|----------|------------|
| CP 1 | 23 | 1,5 | 0.417 | 0.417 | 0 | 0.333 | 0.681 | Growing up |
| CP 2 | 19 | 1,3 | 0.437 | 0.437 | 0 | 0.295 | 0.685 | Growing up |

Note: n — number of individuals; Xa — total density of individuals; Ib — recovery index; Iq — growing old index; Ie — replacement index; Δ — age index; ω — efficiency index.

The number of individuals and the average density were recorded the most in CP 1, and the least in CP 2. The recovery index and replacement index have the highest value in CP 2. According to the Δ and ω indices, both coenopopulations are of the growing up type.

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