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Phytosenology, cultivation and perspectives of use of *Zizifora tenuior* l. species

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Abstract
Data on the phytocenological features of fragrant and spicy species of the *Lamiaceae* Lindl family - *Zizifora tenuior* L., changes in ontogenesis during the assessment, productivity and cultivation of cenopopulations have been provided in the paper. The highest reserves were found in 4 (268, 3 flower phases; 141.3 kg/ha seed phase) and 7 (340; 261.4, respectively) cenopopulations. Resource assessment methods and ethnobotanical methodologies were used for the study.
The plant was cultivated for widely used as a medicinal and nutritional supplement, productivity was calculated in all phases of ontogeny, and the flowering phase (8.5 c / ha) was recommended for collection.

Keywords: *Zizifora tenuior* l., fragrant plant, ontogeny, fertility

Introduction
Wild plant resources are sometimes used for food, sometimes for medicine, and sometimes for technical purposes, and therefore the natural flora is widely used for various purposes. Plants are also used as food additives in cooking, canning or in the preparation of medicines, cosmetics (antioxidants, antimicrobials, etc.) [Ibadullayeva *et al*., 2017]. *Lamiaceae* Lindl. is such plants. The species of the genus occupy an important place due to their aromatic and medicinal properties. There are more than 3,500 species of 200 genus distributed in most of the world's hot and temperate climates, especially in the Mediterranean. Species of the genus playыs an important role in vegetation in the ancient Mediterranean phytochorion - from the Canary Islands to the Western Himalayas. Although the mountainous and lowland xerophytes are widespread in the arid conditions of vegetation, plants are also found in the mesophilic vegetation groups of forest and meadow areas. 36 species of wild species and 2 species in culture are given in the Republic in the work "Flora of Azerbaijan" (VII volume, 1957). The taxonomic structure of the family is based on the multi-volume "Conspect of the flora of the Caucasus" [2006] [6] and, 22 genus and 56 species are represented according to recent work in the area [Babakishiyeva *et al*., 2021] [1]. Representatives of the genus, distributed in the botanical-geographical regions of the Lesser Caucasus (LC) are considered very valuable in terms of vegetables, food additives and medicines. Plants are widely used by local communities as both vegetables and medicine. Taking all this into account is proposed to study the phytocenological structural features and cultivation methods of *Zizifora tenuior* L., one of the fragrant species of *Lamiaceae* family, which is widespread in the flora of the Lesser Caucasus.

Materials and methodology
The research was carried out in 2019-2021 in Goygol, Dashkasan, Gadabay, Shamkir and Goranboy districts of the Lesser Caucasus whitin Azerbaijan. *Zizifora tenuior* L. was taken as an object, phytocenological features were studied in natural flora, seeds were collected and cultivated in the yard. Seeds collected from plants from various sources, including expeditions were first stored in medium-term refrigeration chambers for long-term protection in *ex-situ* conditions [Yusifov, 2011] [11]. For this purpose, the moisture content, germination capacity and viability potential of the seed samples of the plants to be stored have been studied in advance. In order to characterize and evaluate the relevant characteristics of seed samples, the moisture content and germination capacity of the samples were determined in accordance with the methods described in the literature [Agricultural Seeds..., 2005] [4]. The species is annual, taking into account the distance between the rows from 45 cm to 70 cm. The biology of the plant has been studied and the seeds of the plant will develop themselves and complete the life cycle in next year as known. Preparation and maintenance of soil for planting were carried out in accordance with agro-technical rules and in accordance with generally accepted recommendations for cultivation [Emelyanova, 1969] [5]. For the optimal regime of mineral nutrition throughout the vegetation period, before planting and under cultivation (30% nitrogen and 100% phosphorus fertilizers), during the growing season - the rest of the nitrogen fertilizers in the form of feed was given 2-3 weeks after emergence (40%). The collection was carried out by hand, and the weight of the surface part of the plants was determined. Observations on the developmental characteristics of ontogenesis of *Zizifora tenuior* L. in stationary conditions, distributed in the study area are based on T.A. Rabotnov [1992] [9], and phenological observations by I. N. Beydman [1960] and P.Lapin [1975] [8] methods.
Here, the settlement of the plant mainly annual types, the degree of stratification in phytocenoses, etc. was observed. Formations and associations have been identified, the projective cover of areas has been calculated, the structure of the plant location, the highest occurrence of plants, the attitude to edificators, abundance of its field, degree of distribution and role in cenoses, general floristic

composition, and floristic-geobotanical indicators are identified, the richness of flora is determined.

Population productivity was determined according to generally accepted methodologies. Special sites have been marked and model samples have been selected to determine the reserve in the specific areas where the species is distributed. In addition, 15-20 model plants from each population were extracted and weighed to calculate plant raw material reserves. Number of methods to study the current state of species in populations and to assess cenopopulations has used in geobotanical research.

Using the concept of the discrete description of ontogeny, developmental stages in plant individuals were characterized. The description of ontogenesis is based on the forms of the ontogenetic situation. The plants were registered in the juvenile (j), immature (im), virginil (v), young generative (g_1), middle age (g_2), old generative (g_3), subsenil (ss) and senil (s) periods. The following population indicators were used to determine the integrated characterization of the demographic structure of the plant:

1. Age index [Uranov, 1975] [10].

$$\Delta = \frac{\sum k_i x\, n_i}{N}$$

k_i - "value" of the i-ontogenetic state, n_i-the number of individuals, i-the state of the population, and N - the total number of individuals in the population.

2. Efficiency index [Zhivotovsky, 2001] [7]:

$$\omega = \frac{\sum n_i x\, e_i}{\sum N_i}$$

n_i - number of plants, i-condition, e_i-plant efficiency.

Results and discussion

There are 6 species of *Zizifora* genus in the flora of Azerbaijan. These species are constantly attracting attention as fragrant plants. Their least common species in nature is *Zizifora tenuior* L. Therefore, we considered it expedient to cultivate this species.

Zizifora tenuior L. - annual-therophyte, a low-growing plant, xerophyte, less demanding to water. Plant is found from the plains to the middle mountain belt in nature. The body is solitary, short, up to 8-10 cm. Single side trunks are also found. The flowers are 5-16. Flowering begins in late April, early May, fruiting lasts from late June, early July and even August. During the observation, there is no significant difference in the ontogenesis of the plant between the natural and the cultivated plant.

Zizifora tenuior L. species are found in clayey, sandy-gravelly areas, sometimes along rivers, and is considered to be one of the elements of mountain-xerophytic vegetation in the Lesser Caucasus in the Bozgir plateau, Shamkir, Goygol, Dashkasan, Gadabay, Goranboy and Karabakh districts of Azerbaijan. Plant types, formations and associations of *Z.tenuior* species is found in Bozgir plateau (CP1), Shamkir district (CP2; 3); Goranboy district (CP4), Dashkasan (CP5), Goygol (CP6; 7), Gadabay (CP8; 9), (Table 1).

Table 1: Phytocenological structure of *Zizifora tenuior* L. Species

№	Territorial association of cenopopulation	Composition of associations (main species shown)	Projective cover (%)	Abundance
CP1	Steppe plateau Jeyranchol	*Z. tenuior + Nepeta zangezura + Artemisia absintium + Achilleatenuifolia+Herbosum*	40	cop_2
CP 2	Shamkir district, Dashbulag v.	*Z.tenuior +Eryngiumcampestre+ Rosa canina + Torulinium caucasicum+Herbosum*	60	cop_3
CP 3	Shamkir district, Saritapa v.	*Z.tenuior + Geranieta collinum + Calystegia sepium+ Cephalaria syriaca+Herbosum*	30	Sol
CP 4	Goranboy district, Gulustan v.	*Z.tenuior + Zygophyllum atriplicoides + Poligonatum orientale+Allium schoenoprasum*	45	Soc
CP 5	Dashkasan district, Khoshbulag v.	*Z. tenuior + Nepeta cataria + Poa bulbosa + Eremopyrum triticeum +Herbosum*	40	cop_2
CP 6	Goygol district, around Zaligol lake	*Z.tenuior + Trifolium trichocephalum + TLamium album+Herbosum*	45	cop_2
CP 7	Goygol district, Togana v.	*Z. tenuior +Arum rupicola+ Trifolium minima+ +Herbosum*	55	cop_3
CP 8	Gadabay district Artepe v.	*Z. tenuior + Hiperycum perfolatum + Saturea macrantha+ Herbosum*	60	cop_3
CP 9	Gadabay district Toplar v.	*Z. tenuior +Thymus caucasica + Hemerocallis fulva+ Pinus granatum+Herbosum*	50	cop_1

The research was conducted in all phases in the spring-summer season. The role of *Z. tenuior* in plant type has been identified and mainly distribution of plant in moutley-grass formations has been found. The plant belongs to the ecological group of xerophytes and also a steppe, meadow element. The composition, abundance, distribution areas and their projective cover of the main associations in the steppe and meadow plants, where the *Z. tenuior* species is more common are different as can be seen from the table. This is also true for other studied species. The names of the main edificators are indicated in the spelling of the associations. 20-30 plants are determined in each association. 9 cenopopulations were assessed in the above-mentioned areas as it is a valuable fragrant plant (diag. 2).

The number of individuals belonging to the generative development phase is higher as can be seen from the figure. Most plants were found in individual CP4 (69 plant samples) and least in CP 9 (42). In order to determine the growth dynamics and age of *Z. tenuior* species in the selected cenopopulations, all individuals encountered from the juvenile period to the sinus period were recorded, and the composition of the ontogenesis of cenopopulations (CP) after calculating the resulting indicators according to the methodology is shown in Table 2.

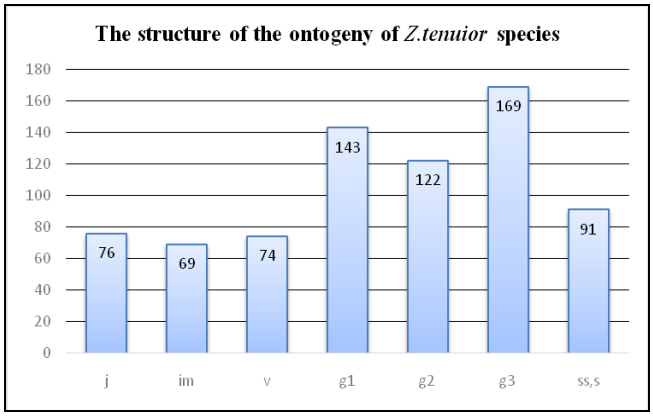

Fig 1: Number of individuals in cenopopulations

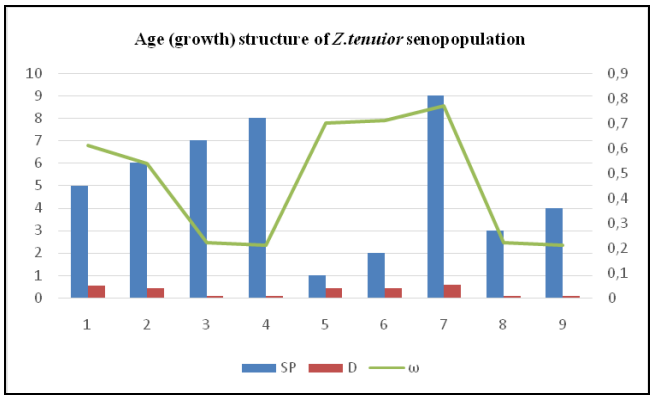

Fig 2: Age and efficiency ratios in cenopopulations

All groups of plant ontogeny are found in the populations, but no cyanide phase is found in populations 8 and 9, populations 5 and 6 are young, and 1, 2, 3, 4 are mature as can be seen from Figure 1. The 7th population is fully mature. Efficiency index of the 2nd, 5th and 7th populations is high was found in the experiments conducted during the study of the cenological condition. Plant reserves were studied in each population during the study. For this purpose, calculations were carried out in accordance with the generally accepted methodology in the area of 10 square meters where the plant is spread [Zaiko *et al*., 2007] [12]. The results are shown in Table 2. Seeds collected from each cenopopulation were planted in the yard. The seeds of the specimens were sown in the first decade of November at a depth of 5-10 cm by hand in 3 repetitions, with rows 2m long, 45-50cm between rows and 5-10cm between plants in all research years. Weeds were cleaned 3 times by hand during the experiment. Observations made on the growth of the plant as shown from table 3. Phenological observations were made at all stages of plant development over the years, and variability in ontogeny was recorded during these studies.

Table 2: Natural resources of *Ziziphora tenior* L. in different districts (in terms of kg/ha of dry weight)

CP №	Flowering period	Mature plant
CP1	154,00 ±13,19	98,00 ± 2,18
CP 2	190,00 ±15,38	115,4 ±11,33
CP 3	113,6 ±11,33	124,6 ± 21,45
CP 4	268, 3 ±25,3	141,30 ± 8,44
CP 5	110,40 ±16,58	95,78 ± 10,60
CP 6	196,45 ±19,9	167,5 ± 21,5
CP 7	340,00 ± 20,10	262,1 ±28,9
CP 8	124,6 ± 21,45	113,6 ±11,33
CP 9	178,00 ±14,67	166,12 ±16,8

Table 3: Phenology of growth development of *Ziziphora tenior* L. (cm)

Years	Developmental phases					
	First true leaves	Stem formation	Buds	Flowering	Fruit formation	Full ripening
2019	3,8	5,5	7,9	8,5	10	11
2020	3,6	5,8	7,9	10	11	12

The growth of this plant is more intensive in the early stages of development. Attention was paid to the number of leaves and the dynamics of development in parallel with the study of height development. In this case, the formation of the main leaves was observed 6-8 days after the initial juvenile stage. These leaves are better to use for food after 5-10 days. The number of leaves and branches was calculated from the formation of the first main leaves to the full ripening phase during the monitoring. The number of leaves reaches a maximum (19-25) during fruiting. The number of branches in a plant is almost the same at all stages (1-3). The leaves that later form on the side branches are also important for food and medicine. The diameter of the stem reaches a maximum during the fruiting phase (7 mm). At full maturity, on the other hand, shrinkage (up to 4 mm) was observed. In addition, the productivity of the plant in all phases was determined. The results of the observations are reflected in Table 4. The productivity in the formation phase was very low (0.65-0.70 c / ha). The highest yield (6,17-8,54c / ha) was observed during flowering as can be seen from the table. Thus, the surface part of *Z.tenuior* is not only a valuable medicinal plant, but also beautiful and fragrant. So plant is recommended to cultivate it in large plantations, even in the backyards of kindergartens, nursing homes, boarding schools and boarding schools. The leaves are added to national cuisine - "kutab", cake-like pastries and prepared into a "dougha".

Table 4: Dual productivity of the surface part of *Z.tenuior* species (c/ha) in 2020-2021

Developmental phases				Measurement error
Stem	Budding	Flowering	Fruiting	
0,65	5,73	6,17	5,15	0,1±0,6
0,70	6,71	8,54	6,40	0,1±0,7

References

1. Babakishiyeva TC, Ibadullayeva SC. Rare plants of Ganja-Gazakh region / (monograph) Ganja-2021. 225 s.
2. Beideman I.N. Study of plant phenology. In the book. Field Geobotany, USSR Academy of Sciences, 1960:2:330-360.
3. Conspect of the Flora of the Caucasus. Vol. I-III, 2003,2006,2008,2012.
4. Seeds of agricultural crops. Admission rules and methods of sampling from seeds. State Agency for Standardization, Metrology and Patents, Baku, 2005.
5. Emelyanova LK. About the experience of new one-year cultures in silage and hay in the conditions of Buryatia //Tez.allunion.simpoz. "New and small-scale forage and silage plants" - Kiev: Nauk.dumka, 1969, 114-117.
6. İbadullayeva Sayyara, Zaifizadeh Muhammed, Seyid Şiva Asbaghian Namin, Jafarli İlhama. Folk medicine (Ethnobotany in Azerbaijan Region). İran-Azerbaijan, Tehran, 2017, 288p.
7. Zhivotovsky L.A. Ontogenetic spectra, effective density and classification of plant populations // Ecology, 2001:1:3-7.

8. Lapin PI. Methods of phenological observations in botanical gardens of the USSR M, 1975, 27.
9. Rabotnov T. A. Phytocenology. 3rd ed. M.: MSU Publishing House, 1992, 352.
10. Uranov A.A. Age spectrum of phytocenopopulations as a function of time and energy wave processes / A.A. Uranov // Biology,1975.2.c.7–34.
11. Yusifov M.A. Crop production, Baku, “Ganun” publishing house, 2011, 368.
12. Zaiko LN, Pimenova RE, Maslikov VY. Review of the method and results of the study of medicinal plants of Russia (Based on the material VILAR). Materials Science. - Practice. Conf. Modern problems of phytodesign. Belgorod, 2007, 148-157.