

Comparative morphological analysis of species of *Teucrium* L. collected from Guba massif of the Greater Caucasus

Sabina F. Hajiyeva ¹

Institute of Botany Public Legal Entity, Ministry of Science and Education of the Republic of Azerbaijan, A. Abbaszade str., entr. 99, AZ1073, Baku, Azerbaijan

Rashad A. Salimov 

Scientific Research Center, Baku Engineering University, Khirdalan, Hasan Aliyev str. 120, AZ0101, Absheron, Azerbaijan

¹Corresponding author (e-mail: shajiyeva555@gmail.com)

Abstract: The present study investigated the morphological characteristics of species belonging to the genus *Teucrium* (*T. chamaedrys*, *T. orientale*, *T. hircanicum* and *T. polium*) collected from Guba massif of the Greater Caucasus. The aim of the research was to identify the characteristic morphological features of the collected species and to clarify their diagnostic characteristics. Based on 33 plant specimens collected during field studies conducted in 2021–2022, the structure of the stem, leaf, flower, fruit was examined and compared with literature data. Interspecific differences were determined in the structure of vegetative and generative organs, including the shape of the leaf blade, leaf margin structure, color of the calyx and corolla, density of pubescence, as well as the type of inflorescence. Morphometric measurements of traits such as inflorescence length, distance between inflorescences and number of flowers per inflorescence were also conducted. The arithmetic mean (M) and standard deviation (SD) were calculated for the measured traits and the level of variability was assessed using the coefficient of variation (CV) and the adjusted coefficient of variation (CV_{corr}). The results of the study make a scientific contribution to a deeper study of the species diversity of the flora of the Greater Caucasus and the systematic characteristics of *Teucrium*.

Keywords: generative, germander, plant, species diversity, specimen, vegetative

INTRODUCTION

Lamiaceae Martinov (= *Labiatae* Juss, the mint family), is distributed worldwide and comprises more than 7200 species belonging to approximately 240 genera di-

vided into seven subfamilies [Harley et al. 2004]. C.I. Hedge [Hedge 1992] conducted a global survey of the biogeography of the family and identified six hotspots of distribution in the diversity in *Lamiaceae*. Except for *Symphorematoideae* Briq. and many *Viticoideae* Briq. with an Indomalasian (SE Asia) center of diversity, the remaining subfamilies are mainly restricted to other regions [Hedge 1992] and can be separated into two geographical groups: (1) primarily tropical in origin and (2) probably temperate in origin, but often extending into the montane tropics. *Teucrium* L. (*Ajugoideae*), although having a distinct center of distribution in the Southern Hemisphere, reaches its greatest species richness in the Northern Hemisphere, spreading down to the mountains of tropical Africa [Harley et al. 2004]. The genus is widespread in both the Old and New World, the main center of diversity is located in the western Mediterranean region, namely the Iberian Peninsula and adjacent Morocco. The genus includes shrubs up to 1.5 m tall, subshrubs, perennial and annual herbs [Navarro, El Oualidi 1999]. The original circumscription of *Teucrium* was provided by C. Linnaeus [Linnaeus 1753], who described 27 species of the genus. Subsequent authors assigned some of these taxa to the segregate genera *Chamaedrys* Mill., *Polium* Mill. and *Scorodonia* Hill. [Miller 1754; Hill 1756], while others reduced these segregates to sectional rank [Schreber 1774; Bentham (1832-1836), Briquet 1897a; McClintock & Epling 1946; Tutin & Wood 1972; Navarro & El Oualidi 2000].

The first subgeneric classification of *Teucrium* was proposed by J.C.D. Schreber [Schreber 1774], who divided *Teucrium* L. into four sections. G. Bentham [Bentham (1832-1836)], E. Boissier [Boissier 1879], and W.B. Hemsley [Hemsley 1890] modified Schreber's classification through a reduction in the number of sections. Following the comprehensive accepted revision by J. Briquet [Briquet 1897], a series of studies with a stronger regional focus were carried out by E. McClintock and C. Epling [1946], T.G. Tutin and D. Wood [1972], T. Navarro and J. El-Oualidi [2000]. J. Isayev treated the genus *Teucrium* L. in the Flora of Azerbaijan [Karjagin 1957] and reported eight species for the flora

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of Azerbaijan.

In 1967, F.A. Akhmadzade while studying the distribution of the genus *Teucrium* in the Caucasus, as a result of comparative morpho-anatomical studies of vegetative organs, discovered two new varieties of the species *T. polium* L. - *T. polium* var. *hemiconvolifolium* Achm. and *T. polium* var. *nonconfolium* Achm., while the status of the species *T. nuchense* K. Koch remains undetermined. Molecular analysis of *T. nuchense* K. Koch, in order to reveal species status remains unclear, but the study is currently underway (personal studies).

The global classification of the genus was carried out by A. Kästner [1978, 1989], who reduced the number of sections to six and recognized numerous subsections. In 2014, D. Melnikov [2014], while revising the genus *Teucrium* L., used the rank of subgenus for the first time and divided the genus into 6 subgenera, 15 sections, and 7 subsections.

In 2016, Y. Salmaki [2016] conducted phylogenetic analyses based on nuclear ribosomal DNA (ITS) and chloroplast DNA (*ndhF* gene, *trnL-F*) sequence data from 101 taxa to estimate phylogenetic relationships among *Teucrium* and its closest allies. The study revealed that the genus *Teucrium* is paraphyletic, as the genera *Teucriidium*, *Spartothamnella* and *Oncinocalyx* are nested within it, while *Rubiteucris* and *Schnabelia* were recognized as sister groups to *Teucrium*. The shape of the calyx was confirmed to be an important diagnostic character for distinguishing various clades within the genus. Based on the cladograms, the pattern of karyotype evolution suggests that switches in ploidy level are common in at least two groups. The cosmopolitan distribution of the genus was attributed mainly to its adaptation to drought stress and adjustment to Mediterranean climatic conditions.

Molecular dating analyses indicate that the diversification of *Teucrium* occurred at the Middle/Late Miocene boundary and was associated with climatic and tectonic changes of the Tertiary period. In 2018, R. Marzouk [2018] assessed the genetic diversity of 12 *Teucrium* taxa collected from Libya by RAPD and ISSR methods. Both the total and specific bands, polymorphism percentage, Shannon index (H), and Simpson index (D) were determined and the data were analyzed by cluster analysis and principal component analysis. The *Teucrium* taxa, particularly *T. polium* subsp. *flavovirens*, were characterized by relatively low genetic diversity. The taxa of each section were not grouped, and the dendrogram resulted in distinct differentiation among taxa (similarity level of 0.545).

T. capitatum and *T. polium* were recognized as two separate subspecies: *T. polium* subsp. *flavovirens* as *T. luteum* subsp. *flavovirens*. It was doubted that they were assembled under *T. polium*. According to A. Aksoy [2020], D. Melnikov's system [2014] should be reconsidered based on broader morphological data. Although A. Aksoy's research findings generally coincide with those of Y. Salmaki et al. [2016], he noted that it would be more appropriate to divide the section *Teucrium* into three subsections—*Orientalia*, *Fruticantia* and *Cretica*, rather than two. In 2025, phylogenomic analyses of nuclear genes sequenced by targeted enrichment (Angiosperms353) conducted by T.C. Wilson [2025] for all Australasian species, phrase names and outgroups (39 total). It was determined that *Teucrium* species consist of at least two distantly related clades. It was shown that in the lineage adapted to arid conditions and characterized by an actinomorphic corolla and fleshy fruits, the crown age of the clade is estimated at 10.2–14.8 million years (Ma), whereas in the second clade, comprising only three species, the crown age ranges from 5.9 to 12.2 million years. This indicates dispersal associated with the Sunda–Sahul collision, repeated colonization events of Australia by the genus *Teucrium*, and a shift to animal-mediated dispersal that occurred approximately 9.2 million years ago.

It was established that the macromorphological and micromorphological characteristics of certain *Teucrium* species make it possible to assess the taxonomic significance of floral morphology within this genus [Ecevit-Genç et al., 2026]. The primary objective of the presented article is to characterize the morphological diagnostic features of species belonging to the genus *Teucrium* in Guba massif of the Greater Caucasus and to identify differences depending on their distribution areas.

MATERIAL AND METHODS

Specimen collection. Plant specimens belonging to the genus *Teucrium* L. were collected from the territories of the villages of Griz, Grizdahna, Garay in Guba district, as well as Laza and Kuzun in Gusar district. During the study, morphological-systematic methods as well as literature sources were used (Table 1, Fig. 1).

Morphological characterisation. During the study of the collected plant samples, the length of the stem, the width and length of the leaves, the length of the peduncles, the distance between the peduncles, the number of flowers in the peduncle, as well as the structure of the

Table 1. Collection sites and altitudes of *Teucrium* L. species in Guba massif of the Greater Caucasus.

Species name	Collection area	Digital coordinates
<i>T. chamaedrys</i> L.	Grizdahna village, Guba district	1245m; 41°14'308"N, 48°18'505" E
	Grizdahna village, Guba district	1271m; 41°13'992"N, 48°18'301"E
	Garay village, Guba district	1083m; 41°19'438"N, 48°19'592"E
	Kuzun village, Gusar district, bank of the Gusar River	1247m; 41°20'299"N, 48°09'329"E
<i>T. hircanicum</i> L.	Garay village, Guba district	1083m; 41°19'438"N, 48°19'592"E
<i>T. orientale</i> L.	the road leading to Griz village, Guba district	1588m; 41°12'575"N, 48°15'630"E
<i>T. polium</i> L.	Grizdahna village, Guba district	1271m; 41°13'992"N, 48°18'301"E
	Kuzun village, Gusar district, bank of the Gusar River	1240m; 41°20'369"N, 48°09'328"E
	Laza village, Gusar district	1462m; 41°19'590"N, 48°08'860" E

**Figure 1.** Geographic location of the study area (based on Google Earth Pro): ■ *T. chamaedrys* L., ■ *T. polium* L., ■ *T. hircanicum* L., ■ *T. orientale* L.

stamens in the samples were determined. Traits such as the distance between inflorescences and the length of the inflorescence were studied during the research. The morphological characteristics of species belonging to the genus *Teucrium* L., collected from Guba massif of the Greater Caucasus, were comparatively studied using field materials and based on literature sources [Flora of

the U.S.S.R. 1954; Flora of the Caucasus 1967; Flora of Turkey 1982]. The taxonomic novelties were checked against Euro+Med PlantBase data portal [Euro+Med PlantBase, 2026]. Based on the literature data, the morphological characteristics of various species belonging to the genus *Teucrium* were summarized, the general appearance and morphological characteristics of

the species *T. orientale*, *T. hircanicum*, *T. chamaedrys* and *T. polium* were studied.

Statistical analyses. This was performed for each morphological characteristic. The arithmetic mean (M) and standard deviation (SD) were calculated using Microsoft Excel. The coefficient of variation (CV) and corrected coefficient of variation (CV_{corr}) were determined according to S. Rohlf [1995] as $CV = (SD / \bar{x}) \times 100$. Here, CV is expressed as a percentage, SD (σ) measures the spread of the data, $\bar{x}$ is the Mean (average) of the data set; $CV_{corr} = CV \times (1 + 1 / (4n))$ and n: number of observations.

RESULTS AND DISCUSSION

Teucrium orientale L. Sp. Pl. 2: 562 (1753).

≡ *Melosmon orientale* (L.) Raf., Fl. Tellur. 3: 85. 1837

Perennial plant. Vegetative organ: root and rhizome short, branching, woody, stems few or many, slightly ascending at base or erect, rather densely covered with short, rarely long hairs, oppositely branched in the upper part; leaves rather distant, broadly rhombic, broadly ovate or suborbicular, deeply thrice pinnatisect, rather long, narrowly linear, green or canescent lobes, with short patent or appressed hairs above, rather densely covered beneath with short hairs, sometimes both sides rather densely covered with stiff crisp hairs; inflorescence lax, paniculate or paniculate-corymbiform, its branches usually more or less elongate, often with short secondary branches; peduncles 1-3-flowered, longer than the small dissected bract and the calyx; the calyx short-campanulate, with both short and long scattered hairs, triangular, lanceolate or acute teeth; corolla 1-1.7 cm long, 3-4 times as long as the calyx, blue, filaments to 1.7 cm long, long exserted, with short crisp hairs below; nutlets about 2 mm in size, glabrous, rugose, with bloom of small (Fig. 2: 1-3).

According to literature data, the flowering of *T. orientale* is observed from May to August. This species was collected in July in the direction of Griz village, Guba district (Table 1, 2). This species is generally distributed throughout Azerbaijan, from the lower mountain belt to the alpine zone, on dry stony slopes, rocks, screes, among shrubs, in fields, gardens and vegetable plots. During the study, it was observed that this species grows on a rocky slope.

Teucrium hircanicum L., Syst. Nat., ed. 10, 2: 1095. 1759

≡ *Scorodonia hircanica* (L.) Raf. In Specchio Sci. 2: 171. 1814

= *Scorodonia spicata* Moench, Methodus: 385. 1794

Perennial plant. Vegetative organ: rhizome short, ascending, woody, stems herbaceous, few-branched or simple, densely covered with soft, short or rather long, spreading hairs, often reddish, especially below; leaves ovate-oblong, gradually tapering from deeply cordate or truncate base, obtuse, incised-crenate, with many (10-30 on each margin) large obtuse or subacute unequal teeth, rarely bicrenate, green above, with scattered or rather dense hairs above; calyx 0.3-2 cm long, with vestiture as on stems; lateral branches, shortish, ascending; generative organ: inflorescence showy, dense, spicate, cylindrical; bracts markedly differentiated from upper cauline leaves, linear-subulate, villous-hairy, equaling or slightly shorter than the calyx, concealed among flowers; pedicels straight, spreading, shorter than the calyx; calyx 3-5 mm long, campanulate, drooping, densely patent-villous, 2-lipped, the upper teeth broader than the others, broadly ovate, sparingly pubescent, netted-nerved, the lateral teeth short, nearly semiorbicular, obtuse, the lower teeth ascending, lanceolate, acute; corolla purple, short-villous-hairy outside, half as long again as calyx; filaments long-exserted; nutlets subglobose, ca. 1 mm long, granulate, glandular. June—August (Fig. 2: 4-6).

The plant specimen was collected in July in Garay village, Guba district (Table 1, 2). According to literature data, the species is distributed in Samur-Davachi lowland, the Greater Caucasus (Guba), the eastern and western parts of the Greater Caucasus, the Bozgir plateau, the Alazan-Ayricay valley, the central part of the Lesser Caucasus, the Lankaran lowland and the Lankaran mountain botanical-geographical region – from lowlands to the middle mountain belt – covering forests, shrubs, gardens and irrigation canals (Table 3, 4). The studied specimen was collected from the forest edge.

Teucrium chamaedrys L. Sp. PL., 565. 1753

≡ *Teucrium veronicifolium* Salisb., Prodr. Stirp. Charp. Allerton: 76. 1796, nom. illeg.

Perennial, vegetative organ; woody base; flowering stems slender to fairly stout, ascending at base or upright, usually curved or flexuous, straight, simple or commonly slightly branching, covered on two or all four faces with short, sparse, recurved hairs, pale green or reddish; leaves rather many, more or less remote, usually ovate, rarely elliptic or oblong, cuneately tapering from broadened base, gradually passing into petiole from which they are hardly differentiated, rounded or acutish at apex, largely crenate-dentate or with broad rounded or pointed lobes, entire or more



Figure 2. Morphological features of the *Teucrium* species collected in the Guba massif: *T. orientale*. 1. plant in nature, 2. herbarium specimen, 3. flower, calyx; *T. hircanicum*. 4. plant in nature, 5. herbarium specimen, 6. flower, calyx; *T. chamaedrys* 7. plant in nature, 8. herbarium specimen, 9. leaf, bract, flower, calyx, calyx-tooth; *T. polium* 10. plant in nature, 11. herbarium specimen, 12. leaf, bract, flower (hand-drawn illustration is provided according to Flora of the U.S.S.R. Vol. XX, 1954.

Table 2. Morphological features of the studied species known from literature.

Species name	Stem height	Leaflet shapes	Leaf attachment to stem	Leaf length and width	Inflorescence	Bract (Floral leaves)	Calyx	Corolla	Number of flowers per inflorescence	Position of the stamen	Nutlet
<i>T. chamaedrys</i> L.	10-45 cm (<i>Flora of U.S.S.R.</i>)	ovate, rarely elliptic or oblong, cuneately tapering from broadened base (<i>Flora of U.S.S.R.</i>)	gradually passing into petiole from which they are hardly differentiated (only the lowermost well delimited from petiole) (<i>Flora of U.S.S.R.</i>)	0,7-4 cm long, 0,5-2,5cm wide (<i>Flora of U.S.S.R.</i>)	terminal racemes (<i>Flora of Turkey</i>)	entire or toothed (<i>Flora of Turkey</i>)	5-6 mm long, rather broadly campanulate the short (<i>Flora of U.S.S.R.</i>)	reddish-purple, (including lower lip) 1-1.3 cm long (<i>Flora of U.S.S.R.</i>)	2-5 (<i>Flora of U.S.S.R.</i>)	stamens at least as long as upper lateral lobes (<i>Flora of Turkey</i>)	ca. 1.5mm long, broadly ellipsoid, brown, smooth or scarcely rugose (<i>Flora of U.S.S.R.</i>)
<i>T. hircanicum</i> L.	(20)30-60(80)cm (<i>Flora of Azerbaijan</i>)	ovate-oblong (<i>Flora of U.S.S.R.</i>)	petiolate (<i>Flora of Turkey</i>)	2,5-8 cm long, 1-5 cm broad (<i>Flora of U.S.S.R.</i>)	spike (<i>Flora of Caucasus</i>)	bracts markedly differentiated from upper cauline leaves (<i>Flora of U.S.S.R.</i>)	3-5 mm long, slightly acerescent, campanulate drooping (<i>Flora of U.S.S.R.</i>)	purple, short-villous-hairy outside, half as long again as calyx (<i>Flora of U.S.S.R.</i>)	-	filaments long-exserted (<i>Flora of U.S.S.R.</i>)	subglobose, ca. 1 mm long, granulate, glandular (<i>Flora of U.S.S.R.</i>)
<i>T. orientale</i> L.	10—50 (60) cm (<i>Flora of Azerbaijan</i>)	broadly rhombic, broadly ovate or suborbiculate, deeply thrice pinnatisect (<i>Flora of U.S.S.R.</i>)	subsessile (<i>Flora of Turkey</i>)	1-3 cm long, 1,2-4 cm wide (<i>Flora of U.S.S.R.</i>)	lax, paniculate or paniculate-corymbiform, (<i>Flora of U.S.S.R.</i>)	dissected, shorter than 1-3 flowered peduncles (<i>Flora of Turkey</i>)	3-5 mm long, short-campanulate (<i>Flora of U.S.S.R.</i>)	3-4 times as long as the calyx, blue (<i>Flora of U.S.S.R.</i>)	1-3	filaments to 1.7 cm long, longexserted, with short crisp hairs below (<i>Flora of U.S.S.R.</i>)	nutlets glabrous, rugose, with bloom of small, pellucid, granular glands (<i>Flora of U.S.S.R.</i>)
<i>T. polium</i> L.	up to 25 (35) cm (<i>Flora of Azerbaijan</i>)	linear, oblanceolate or oblong (<i>Flora of U.S.S.R.</i>)	Sessile (<i>Flora of U.S.S.R.</i>)	0,5-3,5 cm long, 1,8 cm wide (<i>Flora of U.S.S.R.</i>)	inflorescences short-peduncled, comprising few very crowded verticillasters, densely capitate, globular or ovoid (<i>Flora of U.S.S.R.</i>)	small, equaling or mostly shorter than the flowers, linear-linear-spatulate, entire, revolute-margined, tomentose (<i>Flora of U.S.S.R.</i>)	shortly tubular-campanulate (<i>Flora of U.S.S.R.</i>)	whitish, only slightly exceeding the calyx, tomentose-villous outside; (<i>Flora of U.S.S.R.</i>)	-	stamens slightly exserted (<i>Flora of U.S.S.R.</i>)	1,5-2 mm long, reticulate wrinkled (<i>Flora of Azerbaijan</i>)

Table 3. Main morphological features of the studied plant specimens measured in this study.

Species name	Stem height (cm) M±SD	Leaf width (cm) M±SD	Leaf length (cm) M±SD	Inflorescence length (cm) M±SD	Distance between inflorescences (cm) M±SD	Number of flowers per inflorescence M±SD
<i>T. chamaedrys</i>	18-33 26±5,7	0,8-1,5 1,1±0,2	1,5-2,5 2,1±0,4	1-1,8 1,2±0,3	1-2 1,8±0,4	2-5 3,4±1,5
<i>T. hircanicum</i>	55-70 60±8,6	1,8-2 1,9±0,1	3-5 4,1±1,0	9,5-15,5 12,3±3,0	-	60-80 67,3±11,0
<i>T. orientale</i>	38-46 42±3,3	0,2-0,3 0,23±0,05	0,8-1 0,9±0,09	1,8-3 2,4±0,6	2-3,5 3±0,4	1-3 2,3±0,9
<i>T. polium</i>	10-18 14±3,0	0,2-0,4 0,4±0,11	1-1,5 1,4±0,3	1,5-2,5 2,1±0,44	0,8-2 1,7±0,1	7-15 9,6±3,1

Table 4. Values of the coefficient of variation (CV) and corrected coefficient of variation (CV) for morphometric parameters of the studied species.

Species name	Stem height CV(%), CV _{corr} (%)	Leaf width CV(%), CV _{corr} (%)	Leaf length CV(%), CV _{corr} (%)	Inflorescence length CV(%), CV _{corr} (%)	Distance between inflorescences CV(%), CV _{corr} (%)	Number of flowers per inflorescence CV(%), CV _{corr} (%)
<i>T. chamaedrys</i>	22,26 23,37	24,6 25,83	19,92 20,91	28,62 30,06	24,63 25,86	44,6 46,83
<i>T. hircanicum</i>	14,43 15,63	5,97 6,47	24,97 27,06	24,43 26,47	-	16,35 17,72
<i>T. orientale</i>	8,05 8,5	22,22 23,61	10,94 11,62	26,13 27,76	13,6 14,45	42,55 45,21
<i>T. polium</i>	22,01 23,11	31,67 33,25	22,01 23,11	21,02 22,07	42,93 45,07	32,6 34,23

or less crenate or incised; teeth or lobes 4-9 on each margin; generative organ: inflorescence short or elongate but usually much less than half the length of stem; bracts fairly large, nearly always exceeding the calyx, more or less concave (especially the upper), entire at cuneate base (lower third and more), otherwise crenate-dentate, generally green, rarely the upper lilac-tinged; verticillasters 2-5-flowered, usually somewhat distant; pedicels shorter than or sometimes equaling the calyx; flowers large, purple; calyx rather broadly campanulate, usually curved hairs scattered or confined to nerves, the triangular short-acuminate teeth to 1,5 times as long as broad, corolla (including lower lip) 1-1.3 cm long; nutlets ca. 1.5 mm long, broadly ellipsoid, brown, smooth or scarcely rugose. June—August (Fig.2: 7-9).

According to literature data, *T. chamaedrys* L. is distributed in the mountainous regions of Azerbaijan—from the lower mountain belt to the subalpine zone-on

rocky, stony and clayey slopes, in forests, clearings, among shrubs, on mountain meadows, stony screes and in gardens. During the study, this species was collected in July from a rocky stony slope near Grizdahna village, Guba district (Table 1).

Teucrium polium L. Sp. PL.: 566 (1753)
 ≡ *Chamaedrys polium* (L.) Raf., Fl. Tellur. 3: 85. 1837
Perennial plant. Vegetativ organ: Subshrub with woody root, strongly branching from woody base; stems many, ascending at base and often strongly flexuous, rarely suberect, tough, densely short-appressed-tomentose, grayish, gray or sometimes snow-white, rarely yellowish or reddish (mostly in lower part), short-paniculate or often distally corymbiform; leaves half to twice the length of internodes, linear, oblanceolate or oblong, cuneate at base, obtuse at apex, shallowly crenate-dentate or in lower part (1/3-2/3) entire, very often revolute-margined, frequently somewhat

wrinkled, sessile, with vestiture as on stems (denser beneath), green or grayish above, grayish or gray beneath; generative organ: inflorescences many at ends of stems and branches, shortpeduncled, comprising few very crowded verticillasters, densely capitate, globular or ovoid; bracts small, equaling or mostly shorter than the flowers, 3-5 mm long, linear or linear-spatulate, tomentose; flowers subsessile, whitish or yellowish; calyx shortly tubular-campanulate, densely whitish or white tomentose, sulcate, the teeth subequal, short-triangular, obtuse, much shorter than the tube, concealed by tomentum; corolla only slightly exceeding the calyx, tomentose-villous outside; stamens slightly exerted. June-September (Fig.2: 10-12).

The plant specimen was collected in July on a rocky stony slope of a rocky area near Laza village, Gusar district (Table 1). This corresponds to literature data indicating that the species is distributed from lowland plains to the middle mountain zone and inhabits dry clayey, stony and sandy slopes, rocky places and semi-deserts with wormwood vegetation.

In 2021–2022, 11 specimens of *T. polium*, 3 specimens of *T. hircanicum*, 4 specimens of *T. orientale* and 15 specimens of *T. chamaedrys* were collected from the Guba massif of the Greater Caucasus. Morphological characteristics such as stem length, leaf width and leaf length were compared with literature data and conformity was recorded.

CONCLUSION

Plant specimens of the genus *Teucrium*, collected from different altitudinal zones of the Guba massif of the Greater Caucasus, showed that the region has high floristic diversity and that the study area is an important distribution range for the genus, confirming the high probability of local occurrence of the species. The comparative morphological analysis of the collected species of *Teucrium* L. showed that the studied taxa differ from each other in the characteristics of vegetative and generative organs. Among vegetative organs, the shape of the leaf blade, margin structure, attachment to the stem, and the degree of surface pubescence can be considered diagnostic characteristics of the species, while among generative organs, the color of the corolla and features of its structure can be identified as diagnostic traits. The comparative analysis of morphological characteristics showed that the morphological differences between individual species are stable in nature and do not exhibit significant variability depending on environmental

factors, which is of great importance for substantiating their taxonomic status. A comparative analysis of the morphometric parameters of the studied *Teucrium* species revealed differences between them that are important for taxonomic differentiation. The species *T. hircanicum* had the highest scores for all traits. The smallest leaf sizes were found in *T. orientale*, the short stems and small flower clusters were found in *T. polium*, and the average scores were found in *T. chamaedrys*. The coefficient of variation (CV) for the studied traits showed varying levels of variability. CV values fluctuating around 10% indicate a stable trait, CV values in the 20-30% range indicate moderate variability, and CV values of 40% or higher indicate high variability. The morphological study of species of the genus *Teucrium*, collected from the Guba massif of the Greater Caucasus, showed that interspecific morphological differences are associated with genetic and morphological factors, and the obtained results provide a basis for systematic and bioecological studies of the genus.

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Böyük Qafqazın Quba massivindən toplanan *Teucrium* L. cinsinə aid növlərin müqayisəli morfoloji təhlili

Səbinə F. Hacıyeva

Botanika İnstitutu Publik Hüquqi Şəxs, Azərbaycan Respublikası Elm və Təhsil Nazirliyi, A. Abbaszadə küç., giriş 99, AZ1073, Azərbaycan

Rəşad A. Səlimov

Elmi Tədqiqat Mərkəzi, Bakı Mühəndislik Universiteti, Xırdalan, Həsən Əliyev küçəsi, 120, AZ0101, Abşeron, Azərbaycan

Aparılan tədqiqat işində Böyük Qafqazın Quba massivi ərazisindən toplanmış *Teucrium* cinsinə aid növlərin — *T. chamaedrys*, *T. orientale*, *T. hircanicum*, *T. polium* morfoloji xüsusiyyətləri öyrənilmişdir. Tədqiqatın məqsədi toplanan növlərin xarakterik morfoloji əlamətlərinin müəyyənəndirilməsi və onların fərqləndirici xüsusiyyətlərinin aydınlaşdırılması olmuşdur. 2021–2022-ci illərdə aparılmış çöl təcrübələri zamanı toplanan 33 bitki nümunəsi əsasında gövdə, yarpaq, çiçək, meyvə quruluşu öyrənilərək ədəbiyyat

məlumatları ilə müqayisə edilmişdir. Növlər arasında vegetativ və generativ orqanların quruluşunda-yarpaq ayasının forması, yarpaq kənarının quruluşu, kasacıq və çiçək tacının rəngi və tükcük örtüyünün sıxlığı eləcə də çiçək qrupu kimi morfoloji əlamətlərdə fərqlər müəyyən edilmişdir. Bitki nüsxələri üzərində çiçək qrupu uzunluğu, çiçək qrupları arasındakı məsafə, çiçək qrupunda çiçəklərin sayı kimi əlamətlərin morfometrik ölçmələri aparılmışdır. Ölçülmüş əlamətlər üzrə orta qiymət (Mean), standart kənarlaşma (SD) hesablanmış, variasiya əmsalı (CV) və korrekte olunmuş variasiya əmsalı (CV_{corr}) vasitəsilə dəyişkənlik səviyyəsi qiymətləndirilmişdir. Tədqiqat nəticələri Böyük Qafqaz florasının növ müxtəlifliyinin və *Teucrium* cinsinin sistematik xüsusiyyətlərinin daha dərinədən öyrənilməsinə elmi töhfə verir.

Açar sözlər: generativ, məryəmnoxudu, bitki, növ müxtəlifliyi, nümunə, vegetativ

Сравнительный морфологический анализ видов рода *Teucrium* L. собранных в Кубинском массиве Большого Кавказа

Сабина Ф. Гаджиева

Институт ботаники Публичное Юридическое Лицо, Министерство Науки и Образования Азербайджанской Республики, ул. А. Аббасзаде, подъезд 99, AZ1073, Баку, Азербайджан

Рашад А. Селимов

Научно-исследовательский центр Бакинского инженерного университета, Хирдалан, ул. Хасана Алиева, 120, AZ0101, Апшерон, Азербайджан

В проведённом исследовании изучены морфологические особенности видов рода *Teucrium*, собранных на территории Кубинского массива Большого Кавказа: *T. chamaedrys*, *T. orientale*, *T. hircanicum*, *T. polium*. Целью исследования являлось выявление характерных морфологических признаков собранных видов и уточнение их отличительных особенностей. На основе 33 растительных образцов, собранных в ходе полевых исследований в 2021–2022 годах, были изучены строение стебля, листа, цветка и плода, а также проведено сравнение с литературными данными. Также были проведены морфометрические измерения таких признаков, как длина соцветия, расстояние между соцветиями и количество цветков в соцветии. Для измеренных признаков были рассчитаны среднее значение (Mean) и стандартное отклонение (SD), а уровень изменчивости оценивался с помощью коэффициента вариации (CV) и скорректированного коэффициента

вариации ($CV_{\text{сорт}}$). Результаты исследования вносят научный вклад в более глубокое изучение видового разнообразия флоры Большого Кавказа

и систематических особенностей рода *Teucrium*.

Ключевые слова: генеративный, дубровник, видовое разнообразие, растение, образец, вегетативный