

## Taxonomic diversity of genus *Berberis* L. (*Berberidaceae* Juss.) in Nakhchivan Autonomous Republic (Republic of Azerbaijan)

A.M. Ibrahimov<sup>1\*</sup>, N.H. Salmanova<sup>2</sup>, A.V. Matsyura<sup>3</sup>

<sup>1</sup>*Institute of Bioresources of Nakhchivan Section of Azerbaijan National Academy of Sciences  
AZ 7000. Babek St. 10, Nakhchivan, Azerbaijan*

<sup>2</sup>*"Nakhchivan" University  
AZ 7000. Babak Avenue 1, Nakhchivan, Azerbaijan*

<sup>3</sup>*Altai State University  
Lenin St. 61, Barnaul, 656049, Altai Krai, Russian Federation*

\*Corresponding author E-mail: [enver.ibrahimov@mail.ru](mailto:enver.ibrahimov@mail.ru)

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We performed long-term field observations and retrospective analysis of *Berberis* L. species for the territory of Nakhchivan Autonomous Republic. We registered six species (*B. densiflora* Boiss. & Buhse., *B. iberica* Stev. & Fisch. ex DC., *B. integerrima* Bunge., *B. orientalis* C.K. Schneid., *B. sphaerocarpa* Kar. & Kir., and *B. vulgaris* L.) and two forms (*Berberis vulgaris* f. *alba* West. and *Berberis vulgaris* f. *lutea* Regel) for this territory. The status of *B. integerrima* Bunge. and *B. orientalis* C.K. Schneid was determined, whereas *Berberis vulgaris* f. *alba* West and *Berberis vulgaris* f. *lutea* Regel forms were determined for Nakhchivan and Azerbaijan's flora for the first time. *Berberis thunbergii* f. *atropurpurea* form was introduced and used in parks and gardens. Shrubs surrounded by wild barberry can be come across in almost all areas of the Nakhchivan Autonomous Republic. They are the main subdominant plants in the formation of forest shrubs, spreading singly or in small groups in the upper, middle and sometimes in lower mountain ranges.

**Key words:** Nakhchivan Autonomous Republic, *Berberis* L., systematics, synonym, wild and cultivated species, spreading, introduction

### Introduction

The Nakhchivan Autonomous Republic is a landlocked exclave of the Republic of Azerbaijan. Nakhchivan Autonomous Republic lays in the south-west of the Lesser Caucasus. It has borders with Iran (163 km, some of which lies along the Araz River), Turkey (11 km) and Armenia (224 km). Nakhchivan covers 5502.75 km<sup>2</sup> and its territory stretches 158 km (from northeast to south-west) (Figure 1).

The natural borders are the northern Daralagez range, the eastern Zangezur range and the southern and south-western part of the Araz river. The lowest territory of the Republic, the Arazboyu plain (approximately 700 m above sea level), covers about one-third of the Republic, whereas the remaining two-thirds are located at altitudes between 1000 and 2000 m a. s. l. or higher. The highest point in Nakhchivan Autonomous Republic is Gapijig Mountain (3906 m). The Nakhchivan Autonomous Republic has particularly continental climate, with more than 2800 h of sunshine annually recorded in the Araz steppes. Rainfall in Nakhchivan varies between 200 and 600 mm, with low humidity throughout.

Minimum and maximum recorded temperatures in the region are - 30 °C and + 40 °C respectively. The area is characterized by hot dry winds, which blow for 50–70 days in the year (above 1000 m) (Babaev, 1999; Country Study, 2004).



**Figure 1.** Study area.

The territory of Nakhchivan Autonomous Republic has a rich flora and variety of vegetation. In the first place, it is due to the natural conditions of the area and due to the extremely complex geological and geomorphologic structure. In the formation of vegetation, anthropogenic factors have a greater role than physical factors. Due to the dry and continental climate, the Autonomous Republic differs from other regions of Azerbaijan. The territory covers the border of several botanical and geographical regions, namely, Caucasian, Central Asian and Iranian flora. About of 3021 species of higher plants were registered in this territory, which are concentrated in 908 genus and 176 families (Talibov and Ibrahimov, 2008). Some of these plants spread over the large areas and formed macrozones, while others are spread over small areas and form microcoenoses.

The flora of Nakhchivan Autonomous Republic is constantly has been studied. However, the species belonging to *Berberis* L. genus have not been adequately investigated. In addition, the available results sometimes outdated and new species appear or penetrate to this area from the neighboring countries. That is why we should constantly monitor the spreading of *Berberis* L. species. Though the wild barberry species were monitored and inventoried, their systematical composition, natural resource and potential usage are not investigated enough.

Our aim was to perform the floristic analysis of *Berberis* L. species and determine their spread in the Nakhchivan Autonomous Republic.

## Materials and methods

Our research had been conducted with growing and collected herbarium of barberry species during 2017–2018 in forest shrubbery places of all mountainous zones of Nakhchivan Autonomous Republic. Regular expeditions have been made in the regions of Nakhchivan AR and the species of the genus of *Berberis* L. have been investigated in detail.

In the usage and determination of the gathered herbarium materials, classical and modern botanical-floristic methods, personal experiences, long-termed skills and experiences were referred here. To clarify the current situation of the representatives of *Berberis* L. in the flora of the Azerbaijan Republic, we checked the herbarium kept at Herbarium Fund of the Botany Institute of Azerbaijan National Academy of Sciences, Bioresources Institute of the Nakhchivan Branch of Azerbaijan National Academy of Sciences and Nakhchivan State University. We also performed a comparative analysis of herbarium samples from various institutions and organizations web sites.

The classical and modern botanical floristic methods, fundamental complete works "Flora of the USSR" (Fedtschenko, 1937), "Trees and shrubs of Azerbaijan" (Zengiyev, 1964), "Higher plants of Azerbaijan" (Askerov, 2005, 2016), "Flora of Azerbaijan" (Rzazade, 1953), "Trees and shrubs of the USSR" (Lozina-Lozinskaya, 1954), Areas of trees and shrubs of the USSR" (Svyazeva and Sokolov, 1980), "Flora of the Caucasus" (Grossheim, 1950), "Dendroflora of the Caucasus" (Sahokiya, 1965), Talibov and Ibragimov (2008), Ibrahimov (2012, 2016), monographs Schneider (1905), Rehder (1949), Ahrendt (1961) have also been used. Defining of the names of systematical taxa with the authors have been performed according to the works of Cherepanova (1995) and "Taxonomical spectrum of the flora of Nakhchivan AR" (Talibov and Ibrahimov, 2008). The International Plant Names Index (IPNI) ([www.ipni.org](http://www.ipni.org)) and The Plant List ([www.theplantlist.org](http://www.theplantlist.org)) were consulted for nomenclatural information. For each locality, the coordinates and altitudes were determined by using GPS. The herbarium of all species were included in the Herbarium Fund of the Bioresources Institute of the Nakhchivan Branch of Azerbaijan National Academy of Sciences.

## Results and discussion

The article provides information about spreading places of the species noted in before was defined and some newly spread zones of the species are informed. Prilipko (1939) reported that there were two species of *Berberis* L., namely, *B. orientalis* C.K. Schneider and *B. integerrima* Bunge, whereas in 1954 he reported three species – *B. vulgaris* L., *B. densiflora* Boiss. & Buhse and *B. iberica* Stev. & Fisch. ex DC. and Grossheim (1950) reported three species *B. vulgaris* L., *B. iberica* Stev. & Fisch. ex DC.,

*B. densiflora* Boiss. & Buhse. Rzazade (1953) registered two species *B. iberica* Stev. & Fisch. ex DC. and *B. densiflora* Boiss. & Buhse, which were supported by Zengiyev (1964) and were considered to be spread in Nakhchivan.

The information comes across about wild barberry in the area of Autonomous Republic in work of Asadov et al. (2001, 2014). The author noted three species - *B. densiflora* Boiss. & Buhse, *B. iberica* Stev. & Fisch. ex DC., *B. vulgaris* L. (Asadov and Asadov, 2001) and later he mentioned (Asadov et al., 2014) *B. densiflora* Boiss. Gurbanov (1996) noted *B. vulgaris* L., *B. iberica* Stev. & Fisch. ex DC.) spread in Nakhchivan basin. Askerov (2005) showed that *B. vulgaris* L. and *B. iberica* Stev. & Fisch. ex DC. spread in Azerbaijan flora, while *B. densiflora* Boiss. & Buhse adopted as free species in *B. iberica* Stev. & Fisch. ex DC. İbragimov (2005) gave information about spreading of *B. vulgaris* L., *B. sphaerocarpa* Kar. & Kir., *B. densiflora* Boiss. & Buhse, and *B. iberica* Stev. & Fisch. ex DC. for this territory.

A recent study of barberry species was done by Talibov and İbrahimov (2012, 2013). They noted that six wild barberry species were spread in this territory - *B. densiflora* Boiss. & Buhse., *B. iberica* Stev. & Fisch. ex DC., *B. integerrima* Bunge., *B. orientalis* C.K.Schneid., *B. sphaerocarpa* Kar. & Kir. and *B. vulgaris* L.

Prilipko, nevertheless, reported *B. integerrima* Bunge, later he defined *B. orientalis* C.K.Schneider as its synonym. Additionally, there are three variations - var. *orientalis* Boiss, var. *littoralis* Boiss, and var. *brachybotrys* Boiss. But, the barberry species in Caucasus and Azerbaijan flora differed by leaves form and structure. Cherepanov (1995) presented and admitted in his last division *B. integerrima* Bunge and *B. orientalis* Schneid) as free species.

Our results and species composition of *Berberis* L. in the territory of autonomic republic were presented below.

#### Genus. *Berberis* L. Spec. Plant. 330 (1753).

The barberry has spread in many regions of Azerbaijan, including Nakhchivan Autonomous Republic, from the lower to the upper mountain ranges. This plant is come across in many woods, wood glades, river valleys and bushes. The following species and forms of *Berberis* L. genus were spread in Nakhchivan Autonomous Republic.

#### Sect. *Integerrimae* Schneid., *BUU. Herb. Boissier*, (2), 5,458, 1905

1. *B. densiflora* Boiss. & Buhse. Nouv. Mem. Soc. Nat. Mosc., XII, 9 (1860); - *B. vulgaris* v. *foliis latioribus subintegerrimis*, Ldb., I, 79. - *B. integerrima* (non Bge.) - N. Busch, Fl. Cauc. Crit. III, 216 (1903); *B. integerrima* var. *densiflora* S.K.Schn. in Bull. Herb. Boiss. II, 5, 461 (1905); Grossgeim, Flora of the Caucasus, II, 126 (1930); Flora of the USSR, VII, 559 (1937); Grossgeim, The description of the plants of the Caucasus, 61 (1949); Flora of the Caucasus, IV, 82 (1950); Flora of Azerbaijan, IV, 112 (1953); Trees and shrubs of the USSR, 3, 64 (1954); Dendroflora of the Caucasus, 3, 115 (1963); Trees and shrubs of Azerbaijan, II, 130, (1964).

It is a big bush with many branchies, height of 1-3 m. The young branches are brownish-yellow, the prickles are three forked under branches and are simple in top branches. Its leaves are reversed and oblong, narrow toward the stalk and are light green. The leaves in above branches are full sided, there are thorns toward top in the edge of the under branches leaves. The flowers situated in the many-blossom bunches. The orange red colored berries are ovoid and sometimes longish, length of 6 mm. Blossoms in May-June, ripen in September-October (Figure 2).



Fig. 2. *Berberis densiflora*. a: fruiting branch, b: fruit.

**Type:** Described from Northern Iran. Type in Leningrad.

**Common distribution:** South and East Caucasus, Iran, North-Eastern Turkey.

**Distribution:** It spread in Lakatagh, 39°17'38" N, 45°50'21" E and Bayahmad villages 39°16'11" N, 45°51'19" E around stone, rocky slopes, sparse forests, among the bushes and bottom of the valleys of Julfa region with *B. vulgaris* L. species (Figure 7).

It resembles *B. integerrima* species, differs from that species for the shape of leaves. The leaves are reverse ovoid or longevity full-fledged or sliced. The bottom is bubbled or smooth. All flower groups are occasionally carry more than 20 flowers. The flowers are short; the length is not more than 5-6 mm, the berries - 6 mm long (Table 1).

**Table 1.** Diagnostic characters of *B. densiflora* and *B. integerrima*.

Characters	<i>B. densiflora</i>	<i>B. integerrima</i>
Stems	Young branches brownish yellow	Branches are brownish or dark red
Spines	Spines solitary, stout, orange, generally 1.5-3 cm	Spines solitary
Leaves	Leaves fairly thick, 2-4.5 x 0.5-1.8 cm, excluding petiole to 1 cm, elliptic to oblong-obovate, cuneate, apex rounded, closely reticulate both sides.	Leaves 2- 4 x 1-2 cm, including short petiole, oblong-obovate, cuneate, entire, obtuse to subacute, below papillose, occasional spindose on leaves of shoots.
Racemes	Racemes narrow, 15-50- flowered	Racemes 10-20- flowered, 4-6 cm
Pedicels	Pedicels slender, 3-6 (7, in fruit) mm, bracts 1 mm	Pedicels 7-10 cm
Berries	Berries elliptic-ovoid, dark red, length of 6-7 (8.5) mm, a width of 4-4.5 mm.	Berries dark red, oblong-ovoid, a length of 7-8 mm and width of 4-4.5 mm.

**2. *B. integerrima* Bunge.** Ind. Sem. Hort. Acad. Dorpat. 1843: 6 (1843); Linnaea 18, 149 (1844); Delect. semin. Hort. Bot. Dorpat., 6 (1843); Arbeit. Naturf. Ver. Riga, 1: 129 (1847); Syn: *B. densiflora* Boiss. & Buhse, Aufz. Transk. Pers. t. 32 (1860); *B. vulgaris* L. var. *integerrima* (Bunge) Trautv. 2, 494 (1873); Flora of the USSR, VII, 558 (1937); Trees and shrubs of the USSR, 3, 61 (1954); Dendroflora of the Caucasus, 3, 148 (1963).

It is the many-trunk branchy with height of 1-3 m. Branches are brownish or dark red. The prickles are simple but in the fruitless branches are two or three forked. Leaves are as leather, reversed ovoid or longish and dark green, a length of 4-5 cm, width of 1.3-1.8 cm, full edge. The leaves are sometimes big in the young branches and the edges are thorny toothed. It is wedge-shaped narrowed toward the stalk. The 12-20 flowers gathered in the many flowering bunches with length of 5 cm. The ripped berries are reverse ovoid and longish with length of 7-8 mm, with width of 4-4.5 mm. It is of dark red and covered with whitish pollen. It blossoms in May and June, ripens in September-October (Figure 3).



**Fig. 3.** *Berberis integerrima*. a: fruiting branch, b: fruit.

**Type:** Described from Zarafshan. Type in Leningrad.

"Am steinigen Ufer des obern Sarafschan und an feuchten Abhängen des Karatau", Bunge 44, LE

**Common distribution:** Anatolia orientalis, Iraq orientalis, Persia, Afghanistan, Transcaucasica, Turcomania, Pakistan occidentalis, Kashmir, Pamir- Alay, Tien Shan, Sina boreo-occidentalis.

**Distribution:** This species spread around stony slopes of Kotam, 38°54'28" N, 46°04'35" E village of Ordubad region and on the edges of the later sown areas of Gilanchay, 39°02'15" N, 45°48'47" E with other species of barberry (Figure 7).

Thought *B. integerrima* Bunge is given as a synonym of *B. densiflora* Boiss. & Buhse in the "Flora of the Caucasus" (Grossheim, 1950), "Flora of Azerbaijan" (Rzazade, 1953) and "Trees and shrubs of Azerbaijan" (Zengiyev, 1964), it is accepted as free species by S.K. Cherepanov (1995).

#### Sect. Crataeginae

**3. *B. iberica* Stev. & Fisch. ex DC.** De Candolle, Reg. Veg. Syst. 2, 6 (1821); Steven & Fischer in litt. ex De Candolle, 1. c. (1821); pro syn. *B. iberica* Sweet, Hort. Brit. 13 (1826);, Rupr. Fl. Cauc., 48 (1869); *B. integrifolia* (non Bge.) - N. Busch, Fl. Cauc. Crit. III, 216 (1903); Schneider in Bull. Herb. Boissier, ser. 2, 5, 656 (1905); *B. crataegina* (non DC.) - Grossgeim, Flora of the Caucasus, II, 126 (1930); Flora of the USSR, VII, 558 (1937); Grossgeim, The description of the plants of the Caucasus, 61 (1949); Flora of the

Caucasus, IV, 82 (1950); Flora of Azerbaijan, IV, 111 (1953); Dendroflora of the Caucasus, 3,115 (1963); Trees and shrubs of Azerbaijan, II, 129, (1964).

It is the many-trunk branchy with a height of 3 m. The prickles under branches are three-forked, in the top they are simple with length of 4 cm. A heap of leaves as leather, reversed ovoid, as web from both sides and narrows toward the stalk. The leaves are full sided. The flowers gathered in many-blossoms mended bunches. The matured berries are dark red, longish cylindrical and 1 cm length. It remains in the tree for a long time. They blossom in May and June and ripen in September and October (Figure 4).



Fig. 4. *Berberis iberica*. a: flowering branch, b: fruiting branch, c: fruit.

*Berberis iberica* Stev. & Fisch. ex DC is differ from *B. crataegina* DC. by some characteristics (Table 2).

Table 2. Diagnostic characters of *B. iberica* and *B. crataegina*.

Characters	<i>B. iberica</i>	<i>B. crataegina</i>
<i>Stems</i>	Young branches are slightly angular, brown-red or brown-purple.	Young branches glabrous, sulcate, mature lustrous dark red.
<i>Spines</i>	The lower spikes are strong, usually 3-split, the upper ones are simple, up to 4 cm long.	Spines yellow, stout, sulcate, 1-2.5 cm. Spines usually shorter than the leaves
<i>Leaves</i>	Leaves are leathery, obovoid or oblong, up to 6 cm long, 1.5–2.5 mm wide, entire.	Leaves 15-30 x 3-7 mm, or to 48 x 8 mm, oblanceolate, attenuate, sessile, entire (rarely 1-2 spinules), acute; both sides concolorous sublustrous deep green, with openly branched venation.
<i>Racemes</i>	Multi-flowered brushes, up to 6 cm long, drooping.	Racemes (6) 8-14 (18)-flowered, (1) 3-5 cm long.
<i>Pedicels</i>	three-branched	Pedicels slender, 5-9 mm, bracts 1 mm.
<i>Flowers</i>		Flowers 7 mm diameter.
<i>Berries</i>	Ripe berries are red, longish cylindrical, a length is 1 cm, it remains on the tree for a long time	Fruit black, epruinose, or scarcely pruinose, oblong-ovoid, 6-7 x 3.5-4 mm.

**Type:** Described from Georgia. Type in Moscow University Herbarium

**Common distribution:** Caucasia, Northern Iran.

**Distribution:** Down, middle and sometimes until the waistband of upper mountain in the sparse forest lands, bushes, and river valleys.

It spreads in Gilanchay, 39°01'29" N, 45°48'49" E valley of Ordubad region and Ayidarasi, 39°30'57"N, 45°11'13"E area of Sharur region of Nakhchivan Autonomous Republic (Figure 7).

Endemic of Caucasus. Plant included in Red List of the endemic Plants of the Caucasus (Lachashvili et al., 2017).

**Sect. Heteropodae** Schneid., *Bull. Herb. Boissier*, (2), 5, 457, 1905; *Ost. Bot. Z.* 67, 216, 1918

**Subsect. Pseudumbellatae** Ahrendt, *J. Bot., Lond.* 80, 104, (Suppl.), 1943

**4. *B. sphaerocarpa* Kar. & Kir.** *Bull. Soc. Nat. Moscou*, 14, 3, 176 (1841); Flora of the USSR, VII, 555 (1937); Trees and shrubs of the USSR, 3, 64 (1954); *Journ. Linn. Soc. London (Bot.)* 57, 227 (1961).

It is 2 m, many-branchy bush. The branches are primarily red, bright and then grayish. The thorns are simple and three-forked, the length is 2.5 cm. The reverse ovoid or oval-shaped leaves are 6 cm long. The flowers are collected in the multicolored bunch in 4.5 cm long are yellowish orange. The berries are 1 cm, dark and sometimes they are bright blue colored. It blossoms in May-June, grows in September-October (Figure 5).



Fig. 5. *Berberis sphaerocarpa*. a: general view of habit and habitat, b: flowering branch, c, d: fruiting branch, e: fruit.

*Berberis sphaerocarpa* Kar. & Kir. differs from *B. heteropoda* Schrenk, while they have similar parameters (Table 3).

Table 3. Diagnostic characters of *B. sphaerocarpa* and *B. crataegina*.

Characters	<i>B. sphaerocarpa</i>	<i>B. heteropoda</i>
Stems	Young branches furrowed or angular, with dark brown bark	Stems finely sulcate, ultimately subterete, dark red.
Spines	Spikes are simple and 3-split, 0.8-1.5 cm.	Spines 3-fid., slightly paler, 5-10 mm, plane to subterete.
Leaves	Leaves are leathery, naked, rounded or almost round, entire or with rare, small, cartilaginous cloves, petioles 0.8-1.5 cm long, leaf plate 2.5-3.5 cm long and 2-3.5 cm wide, bottom with protruding veins and stomata located on the lower side.	Leaves 2-4 (6) x 1-2.7 (4) cm, excluding petiole 3-10 mm, obovate-elliptic, base contracted, margins entire, or indistinctly spinose, both sides reticulate, subconcolorous, or below scarcely paler and lustrous.
Inflorescence	Inflorescence short, slightly flowered axillary brush, 1-2.5 cm long.	Inflorescence 4-9-flowered, fascicled or umbellate, 1-5-3 (5) cm.
Pedicels	Pedicels 8-12 mm long., bracts linearly subulate, gradually pointed, 4-5 mm long, 2-3 times shorter than the pedicel	Pedicels 9-17 mm, bracts 1.5-3 mm.
Petals	Petals 6 x 3.5 mm	Petals 6 x 4 mm, obovate-spathulate, entire, cuneate.
Stamens	Stamens 2 times shorter than petals	Stamens 4.5 mm, produced, apiculate.
Ovules	Ovules, including 5, with long legs, which are 2.5 times as long as ovule eggs.	Ovules 4-5 (6), stipitate.
Berries	The berries are dark blue, with a bluish bloom, spherical, obtuse, pentagonal, strongly flat flattened above, 12-15 mm in diameter. It remains a long time in the tree.	Berries black, slightly pruinose blue, estylose.

**Type:** Described from Middle Asia. Type in Leningrad.

**Common distribution:** Middle Asia, Mongolia.

**Distribution:** In the territory of Arafsa, 39°18'12" N, 45°47'22" E and Lakatagh, 39°17'36" N, 45°50'21" E of Julfa of Nakhchivan Autonomous Republic, on the edge of the sparse forests and river valleys; it grows in a group with hips and bush plants (Figure 7).

**Sect. Vulgares** Schneid., *Bull. Herb. Boissier*, (2), 5, 660, 1905; Sargent, *Pl. Wils.* 3, 440, 1917

5. *B. orientalis* C.K.Schneid. Bull. Herb. Boiss., ser. 2, V, 666 (1905); Flora of the USSR, VII, 557 (1937); Flora of Azerbaijan, IV, 111 (1953); Trees and shrubs of the USSR, 3, 70 (1954); Dendroflora of the Caucasus, 3, 118 (1963).

It is a bush with height of 2 m. The skin of younger branches is yellowish-brown, and the skin of older branches is grey. Its thorns are simple and three-forked. Mainly delicate, sometimes leather shaped leaves are ellipsoid or ellipsoid lancet shaped, it is 4.5 cm, each side is light green and its edges are unclear toothed. Leaves selected clearly as grid. Twenty and more flowers of this plant are collected in dense flowering bunches, which is 7 cm. Its berries are longish and dark red. It blossoms in May-June, and grows in September-October (Figure 6).



Fig. 6. *Berberis orientalis*. a: fruiting branch, b: fruit.

**Type:** Described from Iran. Type in Geneva.

**Common distribution:** Caucasus, Northern Iran, North-eastern Turkey.

**Distribution:** It basically grows in Ashagi, 39°29'58"N, 45°23'51"E and Yukhari Buzgov, 39°31'21"N, 45°21'57"E village of Babek region in dry stony slope of sparse forest and partial bank of the rivers. We can come across this plant in the fields in the mountain slopes. It grows in a few amount in spreading areas (Figure 7).

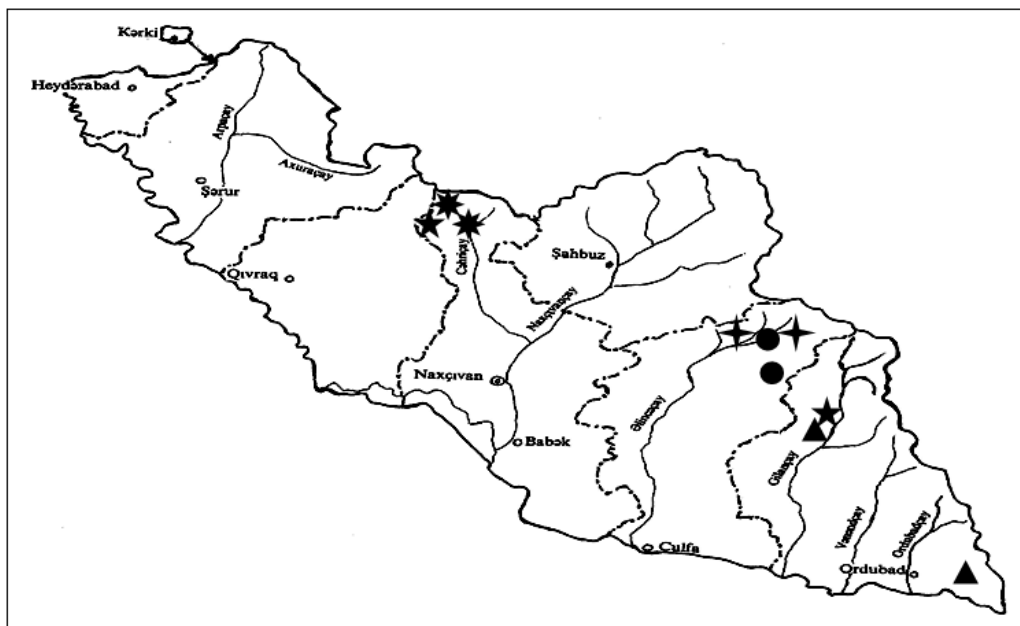


Fig. 7. Distribution of *Berberis densiflora* Boiss. & Buhse. (●), *B. integerrima* Bunge. (▲), *B. iberica* Stev. & Fisch. ex DC. (★), *B. sphaerocarpa* Kar. & Kir. (✦) and *B. orientalis* C.K. Schneid. (★•) in Nakhchivan Autonomous Republic.

*B. orientalis* looks like *B. vulgaris* and it is difficult to define these species properly. *B. orientalis* plays an important role in the vegetation cover of the Nakhchivan Autonomous Republic. Prilipko (1939) also indicated eastern barberries in Nakhchivan. Further, it was reported as a synonym of *B. vulgaris* L. (Lozina-Lozinskaya, 1954; Grossheim, 1950; Rzazade, 1953; Fedtschenko, 1937). Cherepanov (1995) accepted that eastern barberry is also free species. We, thus, defined that in Nakhchivan Autonomous Republic *B. orientalis* C.K. Schneid. had tiny and small thorns, its leaves are ellipsoid and its corners are unclear cusps (Table 4).

**Sect. Vulgares** Schneid., *Bull. Herb. Boissier*, (2), 5, 660, 1905; Sargent, *Pl. Wils.* 3,440, 1917

**6. *B. vulgaris* L.** Sp. pl. 330 (1753). M.Bieb. Fl. Taur. Cauc., I, 286 (1808); Boiss. Fl. Or., I, 102 (1867); Rupr. Fl. Cauc., 47 (1869); Lipsky, Flora of the Caucasus, 214 (1899); Radde Mus. Cauc., II, 47 (1901); N. Busch, Fl. Cauc. Crit. III, 213 (1903); Syn: *B. orientalis* Schneider- Bull. Herb. Boiss. 2, V, 666 (1905); Medvedev, Trees and Shrubs of the Caucasus, 5 (1919); in Jour. Arnold Arb. 4: 223 (1923); *B.orientalis* C.K. Schn. – Grossgeim, Flora of the Caucasus, II, 125 (1930); Flora of the USSR, VII, 557 (1937); Grossgeim (The description of the plants of the Caucasus, 61 (1949); *B. vulgaris* var. *orientalis* (Schn.) Flora of the Caucasus, IV, 81 (1950); Flora of Azerbaijan, IV, 111 (1953); Trees and shrubs of the USSR, 3, 67 (1954); Dendroflora of the Caucasus, 3,121 (1963); Trees and shrubs of Azerbaijan, II,128, (1964).

It is a 2-3 m multi-branchy bush. The skin of its younger branches is yellowish brown or yellowish-grey, the skin of older branches is grey. The under leaf is 2-cm three-forked. The thorns are strong, sharp, hard and are placed one-by-one on the branches. The light green leaves are tiny, ovoid or reversed-ovoid, sometimes of lancet form, bright on the topside and clear-netted intravenous on the bottom side. Its leaves are blunt from the end and get narrower in the form of wedge-shaped; its corners are of eyelash form and saw-toothed. 15-20 blossoms are light yellow and collected in bunches. Its 12-mm berry is longish and dark red. Its taste is sour, and it is 2-3 seeded. It blossoms in May-June and grows in September-October (Figure 8).



**Fig. 8.** *Berberis vulgaris*. a: general view of habit and habitat, b: flowering branch, c: fruiting branch, d: fruit.

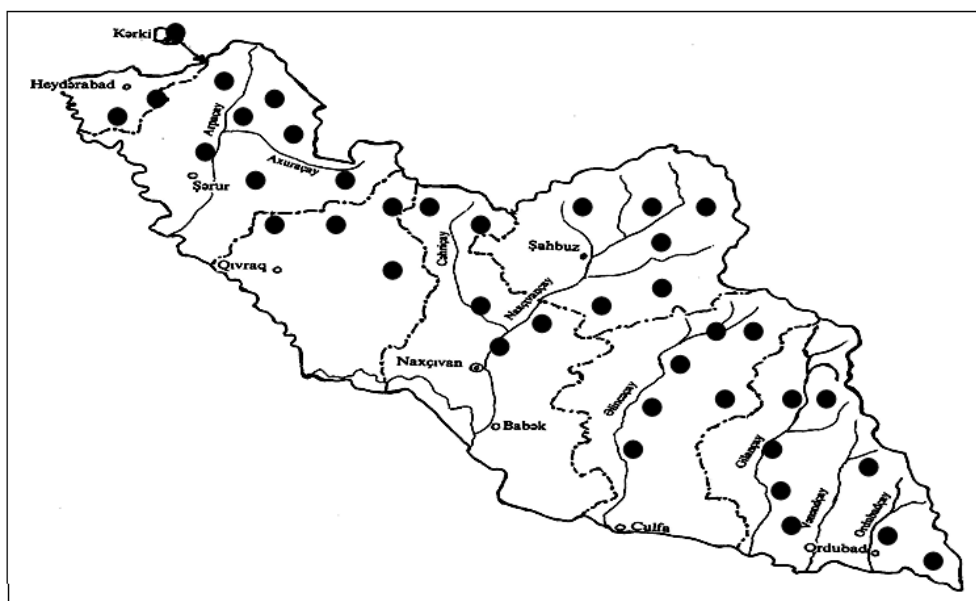
**Table 4.** Diagnostic characters of *B. orientalis* and *B. vulgaris*.

Characters	<i>B. orientalis</i>	<i>B. vulgaris</i>
<i>Stems</i>	The skin of their younger branches is yellowish-brown, and the skin of older branches is grey.	The skin of its younger branches is yellowish brown or yellowish-grey, the skin of older branches is grey.
<i>Spines</i>	Spines 1 (3)-fld., 4-6 mm rarely to 2 cm.	The spikes are usually 3-fld., strong, up to 2 cm long, often simple
<i>Leaves</i>	Leaves 3-6 x 1.3-2.6 (3) cm, ovate-elliptic, decurrent petiole 2-4 mm, margins entire or inconspicuously spinulose-subsermlate, with minute spinules distant 3-4 mm, by the leaf apex, but 0-75 mm long and 1-2 mm distant toward the base, both sides dull, concolorous, closely reticulate.	The leaves are thin, elliptical, obovate, or reversible-lanceolate, narrowed into petiole up to 4 cm long. Ciliated edges, clear underneath, dull at the top.
<i>Racemes</i>	Racemes 15(20)-25 (30)-flowered, 4-7 cm long, with peduncle 1-2 (5) mm.	Racemes a multi-flowering drooping brush up to 6 cm long., 15-25 flowers
<i>Pedicels</i>	Pedicels (5, by apex-) 7-8 (10, below) mm.	Pedicels 5-12 mm long.
<i>Berries</i>	Berries bright red, oblong, 10-11 x 5-6 mm.	Berries are bright red, sometimes yellowish-red, sour, oblong berries up to 12 mm long.

**Type:** Described from Europe. Type in London. "Habitat in Europae sylvis", Herb. Cliff. BM.

**Common distribution:** Caucasus, Europa, Anatolia borealis, Talysh, Persia boreo-occidentalis.

**Distribution:** We can come across simple barberries mostly in sparse forests, shrubbery, valleys of river and edge of the planting fields in the height of 1100-2300 m altitude. It grows as individually or in groups in the spreading areas. Sometimes it creates dense jungles. Around the Gilanchay village of the Ordubad region, a diverse species of peanut has formed along the valley of the same name. It is heat-resistant, cold and frost (Figure 9).

**Fig. 9.** Distribution of *Berberis vulgaris* L. (●) in Nakhchivan Autonomous Republic.

*B. vulgaris* L. is included in the book "Medicinal Plants of the Nakhchivan Autonomous Republic" and Talibov et al. (2018) indicated the ways of its use. It is polymorph for its morphology features. It has been determined that two species of *B. vulgaris* L. were spread in the autonomous republic flora according to the materials and literature data collected during expeditions to study the wild species of the barberry.

**7. *Berberis vulgaris* f. *alba* West.** Bot. Univ. 1, 20 (1770); Fl. Angl. 4 (1775); De Condolle, Syst. Nat. 2, 6 (1821); Voss in Putlitz & Meyer, Landlex. 5, 709 (1913); Schneider in Jour. Arnold Arb. 4, 227 (1923).

It is a 2 m many branched, thorny bushes. It differs from *B. vulgaris* by white berry. Its berry is oval and ovoid-oval, 0.7-0.8 cm and 1-2 seeded. It has sweet sour. It is whitish and light brown when dry. Its seeds are brown, longish, pressed in the middle, blunt or sharp. It blossoms in May-June and grows in September-October. We have included this form to Azerbaijan and Nakhchivan Autonomous Republic flora (Figure 10).



Fig. 10. *Berberis vulgaris* f. *alba*. a: flowering branch, b, c, d: fruiting branch, e: fruit.

**Type:** Described from Europe: "in Europa". Type in London.

**Common distribution:** South Caucasus, East of Turkey, Central and Northern Iran.

**Distribution:** It is spread with the other different species on the left of the road to Soyugdagh of Kotam, 38°53'33" N, 46°03'24" E village in Ordubad region of Nakhchivan Autonomous Republic and in the bushes between the same named village of Gilanchay and Bilav, 39°04'01" N, 45°49'30" E (Figure 12).

**8. *Berberis vulgaris* f. *lutea* DC.** De Condolle, Syst. Nat. 2, 6 (1821); Voss in Putlitz & Meyer, Landlex. 5, 709 (1913); Schneider in Jour. Arnold Arb. 4, 228 (1923).

It is 1.5 m plant covered with firm thorns. It differs from *B. vulgaris* by bright yellowish berries. Its 1-cm berries are longish-ovoid and 1-2 seeded. Its taste is partially sweet. Dried fruits are yellow. Its seeds are light brown, longish-ovoid, pressed in the middle and sharp. It blossoms in May-June and grows in September-October. We also included this form into Azerbaijan and Nakhchivan Autonomous Republic flora (Figure 11).

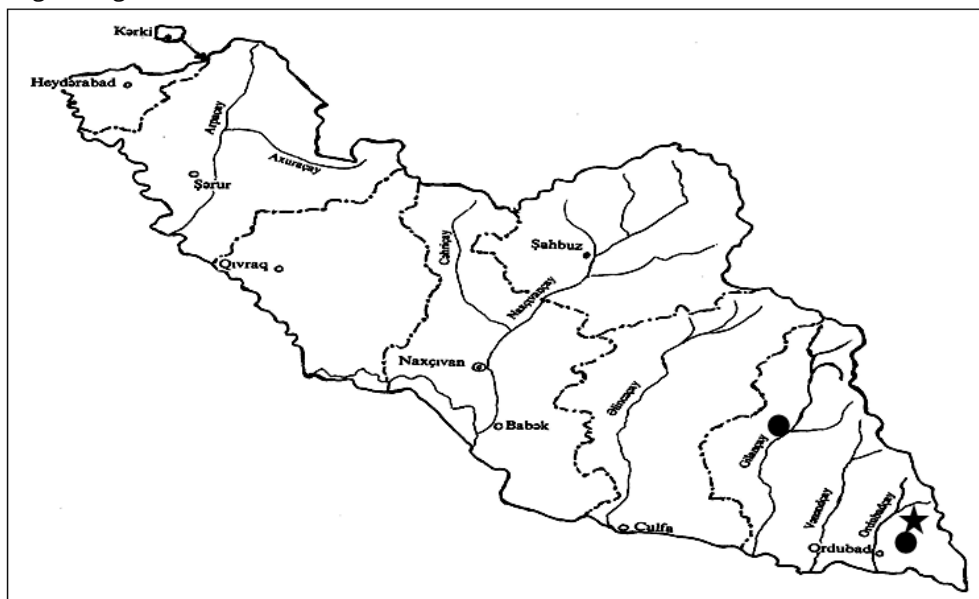


Fig. 11. *Berberis vulgaris* f. *lutea*. a: flowering branch, b: fruiting branch, d: fruit.

**Type:** Described from Europe: "in Europa". Type in London.

**Common distribution:** South Caucasus, East of the Turkey, Central and Northern Iran.

**Distribution:** It is spread with the simple barberries on the left of the road to Soyugdagh of Kotam, 38°54'15" N, 46°03'43" E village of Ordubad region (Figure 12).



**Fig. 12.** Distribution of *Berberis vulgaris* f. *alba* West. (●) and *Berberis vulgaris* f. *lutea* DC. (★) in Nakhchivan Autonomous Republic.

**9. *Berberis thunbergii* f. *atropurpurea* Chenault.** Grad. nov. *Berberis thunbergii atropurpurea* Chenault in Rev. Hort. n. ser. 20, 307 (1926).

It is a 50-60 cm tiny and small thorny bush. The leaves can change their color from dark red to brown red (strong violet). The leaves are bright red in autumn. The inner view of flowers of 2-6 numbers with the flower group is yellow and its outside is reddish. Its 1-cm berries are light or bright red. It blossoms in May-June, grows in September-October. Mature fruits of this plant are eatable and they remain on the branches even in winter (Figure 13).



**Fig. 13.** *Berberis thunbergii* f. *atropurpurea*. a: flowering branch, b: fruiting branch, d: fruit.

**Type:** Described by cultivated specimens.

**Distribution:** As a decorative plant, it is widely used in the greenery of parks and alleys of the city of Nakhchivan. Mammadov (2010) noted that *Berberis thunbergii* DC. is used for planting trees and grass in Baku and Absheron. It is possible to come across fresh bushes surrounded by wild barberries in Khanbulagh of Sharur, Arafsa of Julfa, Gilanchay of Lakatagh and Ordubad in Nakhchivan Autonomous Republic. They spread in the middle and rarely bottom of mountainous zones as single or in a group but not huge and it is one of the main subdominant plants for formation of forests bushes.

We defined six species and two forms of *Berberis* L. in Nakhchivan Autonomous Republic. These species are *B. densiflora* Boiss. & Buhse, *B. iberica* Stev. & Fisch. ex DC., *B. integerrima* Bunge., *B. orientalis* C.K.Schneid., *B. sphaerocarpe* Kar&Kir, and *B. vulgaris* L. The forms are *Berberis vulgaris* f. *alba* West. and *Berberis vulgaris* f. *lutea* Regel. Moreover, *Berberis thunbergii* f. *atropurpurea* form is used in the park planting and garden design being introduced in the cultivated conditions.

The exact determination of species composition and geographical distribution of *Berberis* L. is difficult in Caucasus. In some cases, it is even impossible to define the precise boundaries of species range. The presence of significant intermediate forms among the barberry species testify the intensive hybridization. Many hybrid species are already found in South Caucasus,

particularly in the Nakhchivan Autonomous Republic. Hybrids of such common species as *B. vulgaris* and *B. integerrima* are widely distributed. In addition, K. Browicz & J. Zieliński (1975) and R. Azadi (2009) registered similar hybrids in Iran and Northeast Anadolu area.

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