

Legumes Of The Xerophytic Forest Vegetation in Azerbaijan

Z. J. Mammadova* and E. M. Gurbanov

Baku State University, Azerbaijan

Received: 23 Apr. 2015, Revised: 25 May 2015, Accepted: 28 May 2015.

Published online: 1 Sep. 2015.

Abstract: This study is the first classification of the legumes of the pistachio-juniper dominated forests in semi-arid Azerbaijan.

Keywords: phytocenosis, xerophytic forest, steppe, legumes, xerophytes, semi-arid climate

1 Introduction

Humankind has reduced the xerophytic forests to only 10 percent coverage of Azerbaijan. In these fragmented forests, the endemic trees and shrubs are not found in a natural state anywhere else in the world. This alarming deforestation changes local, regional, and global climate and hydrology; causes wind and water erosion and the resulting desertification, and threatens the biological diversity of the unique plant ecosystems of Caucasia [4].

The xerophytic forests that adorn the foothills of Azerbaijan evolved to rigorously control water and protect soil nutrition. These remaining fragments of the ancient relict forests of Caucasia may hold invaluable knowledge about extending human life spans. The people nestled in isolated valleys typically live to be 100, even 130 years in age. Legumes and other valuable plant species found in these remarkable xerophytic forests enrich the species composition of the Caucasus. These semi-arid Azerbaijani forests grow in mountain-brown soils at 600 m to 1200 m above sea level. These elevations cover the foothills, and the lower and middle zones of the Caucasus Mountains. Both xerophytic forests and mountain steppes with some bushes and shrubs dominate these elevations [1, 2, 4, 6, 8, 9, 10]. Grossheim [6] describes the xerophytic forests of the southern Caucasian Mountains as sparse trees without closed canopies imposed over steppe grasses. Mammadov and Khalilov [4], and Gulisashvili [7] characterize these xerophytic forests as a transition from treeless semi-deserts to forest labeled as the south type forest-steppe.

2 Objective and Methodology

This study develops a phytosenological classification scheme for woody xerophytic vegetation consisting of 1 type, 2 formation classes, 2 formation groups, and 2

associations all located on the southern slope of the greater Caucasus in the (1) Gabala region, (2) Turyanchay Nature Reserve, (3) mountainous part of Lankaran (within Yardimli district), and (4) Nakhichevan Autonomous Republic of Azerbaijan [2]. This classification scheme is provided in Figure 1.

This classification was based on ecological and geobotanical studies, field observations of others, and formulating groups of xerophytic trees based on the leguminous shrubs *Caragana grandiflora* and *Astracantha microcephala*. This study determined the systematic taxa [3, 15] and plant names [14] from projective cover [11], life forms [12], ecological groups [13], and other criteria.

3 Observations

3.1 *Caraganeta – Pistacetum – Juniperosum formation group*

The *Caraganeta-Pistacetum-Juniperosum* formation group grows in the Turyanchay Reserve, 5 km from the Turyanchay River, on dry clay slopes, in lower mountain zone of the Caucasian Mountains [9]. The species composition and structure of this formation was recorded during June 2011 as noted in the geobotanical description provided by Table 1.

Of the 25 species listed in Table 1, 4 (16 percent) are trees, 8 (32 percent) are shrubs, 1 (4 percent) is a semi-shrub, and 12 (48 percent) are perennial herbs. By ecological groups, 20 species (80 percent) are xerophytes and 5 species (20 percent) are mesoxerophytes.

*Corresponding author e-mail: zulfyya_m@rambler.ru

Table 1. Species composition and structure of *Caraganeta-Pistacetum-Juniperosum* formation

№	Name of biomorphic plants	Ecological groups	Abundance (in points)	Average height (cm)	Phenological phases
1	2	3	4	5	6
<i>Trees</i>					
1.	<i>Pistacia mutica</i> Fisch. et C.A. Mey.	xerophyte	3-4	I (600)	vegetative
2.	<i>Acer ibericum</i> Bieb.	mesoxerophyte	2-3	I (500)	flowering
3.	<i>Pyrus georgica</i> Kuth.	xerophyte	1-2	I (400)	fruiting maturation
4.	<i>Celtis caucasica</i> Willd.	xerophyte	1-2	I (300)	fruiting maturation
<i>Shrubs</i>					
5.	<i>Juniperus oblonga</i> Bieb.	xerophyte	3-4	I (400)	vegetative
6.	<i>Caragana grandiflora</i> (Bieb.) DC.	xerophyte	2-3	I (100)	flowering
7.	<i>Crataegus eriantha</i> Pojark.	xerophyte	1-2	I (450)	fruiting
8.	<i>Rhamnus spathulifolia</i> Flsch. et C.A.Mey	mesoxerophyte	3-4	I (250)	flowering
9.	<i>Ephedra procera</i> Fisch. et C.A.Mey.	xerophyte	2-3	I (150)	vegetative
10.	<i>Viburnum opulus</i> L.	xerophyte	1-2	I (120)	flowering
11.	<i>Spiraea crenata</i> L.	xerophyte	2-3	I (100)	fruiting
12.	<i>Astracantha denudata</i> (Stev.) Podlech	xerophyte	1-2	III (30)	flowering
<i>Semi-shrubs</i>					
13.	<i>Thymus hadzhievii</i> Grossh.	xerophyte	1-2	III (15)	flowering
<i>Perennial herbs</i>					
14.	<i>Astragalus glycyphyllos</i> L.	mesophyte	2	II (70)	maturation of beans
15.	<i>Nepeta cataria</i> L.	mesophyte	1-2	II (65)	flowering
16.	<i>Festuca alexeenkoi</i> E.Alexeev	mesophyte	1-2	II (55)	flowering
17.	<i>Bothriochloa ischaemum</i> (L.) Keng	xerophyte	1-2	II (50)	flowering
18.	<i>Hordeum europaeum</i> (L.) All.	mesophyte	1-2	II (40)	flowering
19.	<i>Stipa pulcherrima</i> C.Koch	xerophyte	1-2	I (100)	flowering
20.	<i>Medicago glutinosa</i> Bieb.	mesoxerophyte	1	II (80)	flowering
21.	<i>Artemisia caucasica</i> Willd.	mesoxerophyte	1	II (40)	vegetative
22.	<i>Onobrychis bobrovii</i> Grossh.	mesophyte	1	III (30)	flowering
23.	<i>Poa iberica</i> Fisch et C.A.Mey.	mesophyte	1	III (20)	flowering
24.	<i>Vicia crocea</i> (Dsf.) Fritsch	mesoxerophyte	1	III (15)	maturation of beans
25.	<i>Gagea chlorantha</i> (Bieb.) Schult. et Schult.	xerophyte	1	III (10)	seed formation

The total projective cover is equal to 20-50%

This formation group is represented by *Caraganeta grandiflora-Pistacetum mutica-Juniperus oblonga*. As noted in the classification scheme (Figure 1) and the geobotanical description (Table 1), *Juniperus oblonga* Bieb. is the dominant species of this association. The abundance were evaluated by 3 points, while the abundance of subordinate *Pistacia mutica* Fisch. et C.A.Mey and *Caragana grandiflora* (Bieb.) DC. were evaluated by 2 to 3 and 2 points, respectively.

From the geobotanical description in Table 1, the structure of the *Caraganeta-Pistacetum-Juniperosum* formation consists of three stories of vegetation (trees, shrubs, and herbs). The first story trees (300 cm to 600 cm in height) included *Pistacia mutica*, *Acer ibericum*, *Pyrus georgica*, and *Celtis caucasica*. Also included were the taller shrubs (100 to 450 cm in height) *Crataegus eriantha*, *Juniperus oblonga*, *Rhamnus spathulifolia*, and *Caragana*

grandiflora. The second story included the perennial herbs (40 cm to 70 cm in height) *Stipa pulcherrima* and *Astragalus glycyphyllos*. The third level (height of 10 cm to 30 cm) included *Astracantha denudata*, *Onobrychis bobrovii*, and *Thymus hadzhievii*. The total projected ground cover varied between 20 percent to 50 percent.

3.2 *Astracantheta – Acantholimonetum – Juniperosum* formation group

The *Astracantheta-Acantholimonetum-Juniperosum* formation group is composed of *Astracantheta microcephala*, *Acantholimonetum hohenackeri*, and *Juniperus polycarpos*. *Juniperus polycarpos* C.Koch dominates this association with an abundance of 3 points, whereas the subordinate *Acantholimonetum hohenackeri* (Jaub. et Spach (Boiss.) and *Astracantha microcephala* (Willd.) Podlech) have 2 to 3 and 2 points, respectively.

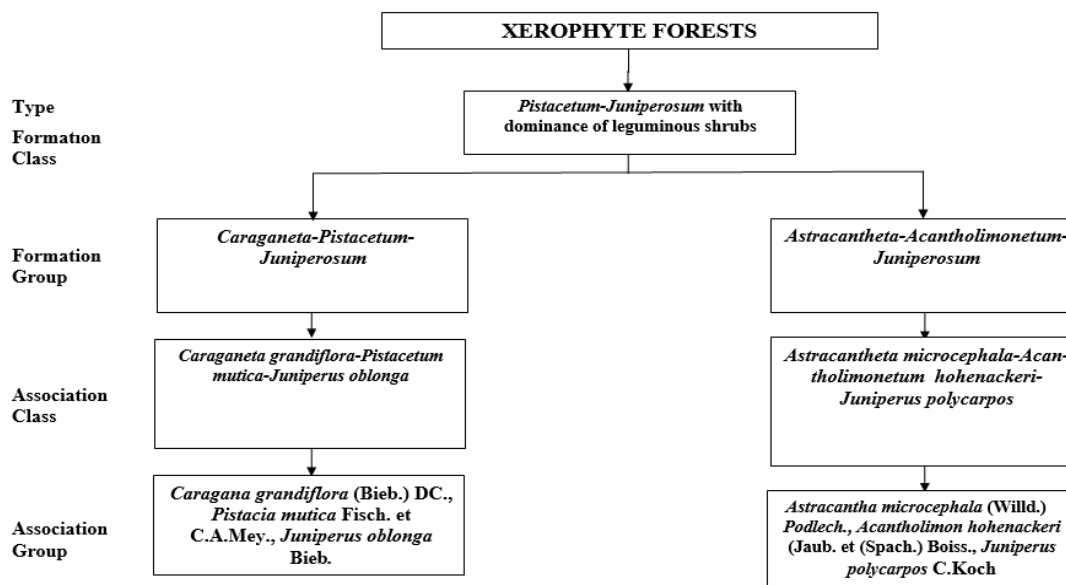


Figure 1. Classification of the xerophyte forest vegetation of Azerbaijan

This investigation observed this formation in the Shakhbuz district of the Nakhchivan Autonomous Republic in the stony pastures near the villages of Arianj and Tirkesh. This same formation occurred at lower elevations of mountainous Lankaran (Zuvand) on dry, rocky slopes.

4 Findings

In the Azerbaijani foothills, cattle-breeding and intensive agriculture since ancient times have fragmented xerophytic communities into the *Caraganeta-Pistaceturum-Juniperosum* and *Astracantheta-Acantholimonetum-Juniperosum* formation groups [5]. The legumes (*Caragana grandiflora*, *Astracantha microcephala*) are subdominant species that allowed these endemic xerophytic communities to evolve and survive fragmentation from anthropogenic activities. Implementation of complex environmental measures designed on scientific basis will pave the way for protection of forests in Azerbaijan.

References

- [1] Allahverdiyeva Kh.M. Juniperus woodlands of the northern slope of Small Caucasus Mountains within Azerbaijan Republic. PhD thesis autoreferat/ Baku, Azerbaijan, 1995, 26 pp.
- [2] Hajiyeve V.J. Map of plant cover of Azerbaijan (scale 1:600 000). Azerbaijan State Land and Mapping Committee. Baku, Azerbaijan, 2005.
- [3] Gurbanov E.M. *Systematics of higher plants*. Baku University Press. Baku, Azerbaijan. 2009. 429 pp.
- [4] Mammadov G.Sh. and Khalilov M.Y. *Forests of Azerbaijan*. "Science" Publishing house, Baku, Azerbaijan, 2002. 472 pp.
- [5] Mammadova Z.J. Significance of Azerbaijani leguminous plants spread in natural conditions. Scientific reports of the Institute of Botany of Azerbaijan National Academy of Science, vol.XXVI. "Science" Publishing house, Baku, Azerbaijan, 2006. pp. 226-228.
- [6] Grossheim A.A. Plant cover of the Caucasus. "MOIP" Publishing house. Moscow, Russia, 1948, 267 pp.
- [7] Gulisashvili V.Z., Makhatazde L.B. *Vegetation of the Caucasus*. Moscow, Russian Federation. "Science" Publishing House, 1975, 308 pp.
- [8] Gurbanov E.M. Plant world of Nakhichevanchay river basin. Baku State University. Baku, Azerbaijan, 1996, 248 pp.
- [9] Gurbanov E.M. Flora and vegetation of Atropatena province (within Azerbaijan Republic). Autoreferat of dissertation for the degree of doctor of biological sciences. Baku, Azerbaijan, 2004, 59 pp.
- [10] Prilipko L.I. Plant cover of Azerbaijan. "Science" Publishing house, Baku, Azerbaijan, 1970, 319 pp.
- [11] Ramensky L.G. *Selected works. Problems and methods for studying vegetation cover.*"Science" Publishing house, Leningrad, Russia.1971, 334 pp.
- [12] *Flora of Azerbaijan*. Publishing House of Academy of Sciences Azerbaijan Soviet Republic, Baku, Azerbaijan. vol. I to VIII, 1950 to 1961.
- [13] Shennikov A.P. *Introduction to Geobotany*. Publishing House of the Leningrad University, Leningrad, Russia, 1964, 447 pp.
- [14] *International Code of Botanical Nomenclature* /Leningrad, 1975; Sidney, 1983; Saint Louis, 1999.
- [15] Cherepanov S.K. *Vascular plants of Russia and adjacent states the former USSR*. Cambridge University Press. Cambridge, USA, 1995, 992 pp.