

## Flora of Kılıçkaya Village (Yusufeli-Artvin, Turkey)

### Kılıçkaya (Yusufeli/Artvin, Türkiye)'nin florası

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#### Abstract

The vascular plant diversity growing in Kılıçkaya (Yusufeli, Artvin), located in the western lesser Caucasus corridor in Turkey, was investigated between 2014 and 2015. In the area under review, 511 plant taxa belonging to 334 genera and 89 families were determined. Of the 511 taxa, 18 Pteridophytes and 492 Magnoliophytes were detected. Magnoliophytes also included 7 Pinophytina and 485 Magnoliophytina. Poaceae (12.13%), Asteraceae (11.15%), Rosaceae (5.87%), Fabaceae (5.47%), Lamiaceae (5.08%) are the largest families, and *Poa*, *Trifolium*, *Geranium*, *Veronica*, *Epilobium* and *Salix* are the largest genera in the study area. The endemism ratio is 5.47 % (28 taxa). Threatened categories were evaluated for 50 taxa according to IUCN Red List Categories.

#### Özet

Türkiye'de, Batı Aşağı Kafkasya Koridorunda yer alan Artvin ili, Yusufeli İlçesi, Kılıçkaya civarında yayılış gösteren iletim demetli bitkiler 2014 ve 2015 yılları arasında araştırılmıştır. İncelenen alanda, 89 familya ve 334 cinsine ait toplam 511 bitki taksonu belirlenmiştir. Bu bitki taksonlarından, 18'i Pteridophyta ve 492'si Magnoliophyta şubesine aittir. Magnoliophyta'nın 7'si Pinophytina ve 485'i Magnoliophytina alt şubesindedir. Çalışma alanından belirlenen en fazla türe sahip familyalar Poaceae (%12.13), Asteraceae (%11.15), Rosaceae (%5.87), Fabaceae (%5.47), Lamiaceae (%5.08) ve en fazla türe sahip cinsler *Poa*, *Trifolium*, *Geranium*, *Veronica*, *Epilobium* ve *Salix*'dir. Endemizm oranı %5.47 (28 takson)'dir. IUCN Kırmızı Liste sınıflarına göre 50 taksonun tehlike kategorileri değerlendirilmiştir.

## INTRODUCTION

Kılıçkaya (Yusufeli) is placed in the Caucasus Hotspot, one of the 36 World Biodiversity Hotspots identified by the Conservation International and in Caucasus Anatolian-Hyrcanian Temperate Forests classified as one of the 200 Global Ecoregions (WWF & IUCN 1994, Zazanashvili et al. 1999) and in the North-Eastern Anatolia Centre of Plant Diversity. It covers the Eastern Black Sea Mountains, designated as one of the 144 Important Plant Areas and one of the 305 Key Biodiversity Area in Turkey (Anonymous 2009, Özhatay et al. 2005, Eminağaoğlu 2012, 2015).

In localities close to the research area, some floristic studies have been carried out by Robson (1967), Wagenitz (1975), Anşin (1979, 1983), Vural (1996), Anşin et al. (2000), Eminağaoğlu and Anşin (2002, 2003, 2004, 2007), Eminağaoğlu et al. (2006, 2007, 2008, 2012), Eminağaoğlu (2009, 2015) and Yüksel and Eminağaoğlu (2017).

The goals of this research were to determine the flora of the Kılıçkaya, determine rare and endemic plant species and evaluate the significance of this area for nature conservation.

### Study Area

Kılıçkaya (Yusufeli-Artvin) is located on the high plateaus of Northeast Anatolia, between 40°49' 05"- 40°33'37"N latitudes and 41°49'59"- 41°18'21"E longitudes. The

altitude of the area ranges from the elevation 520 to 3202 m. The total area is 2327 km<sup>2</sup> and Kılıçkaya (Ersis) village is surrounded by Ormandibi, Çetikedüzü, Bakırtepe and Alanbaşı and its highlands (Figure 1, 2).

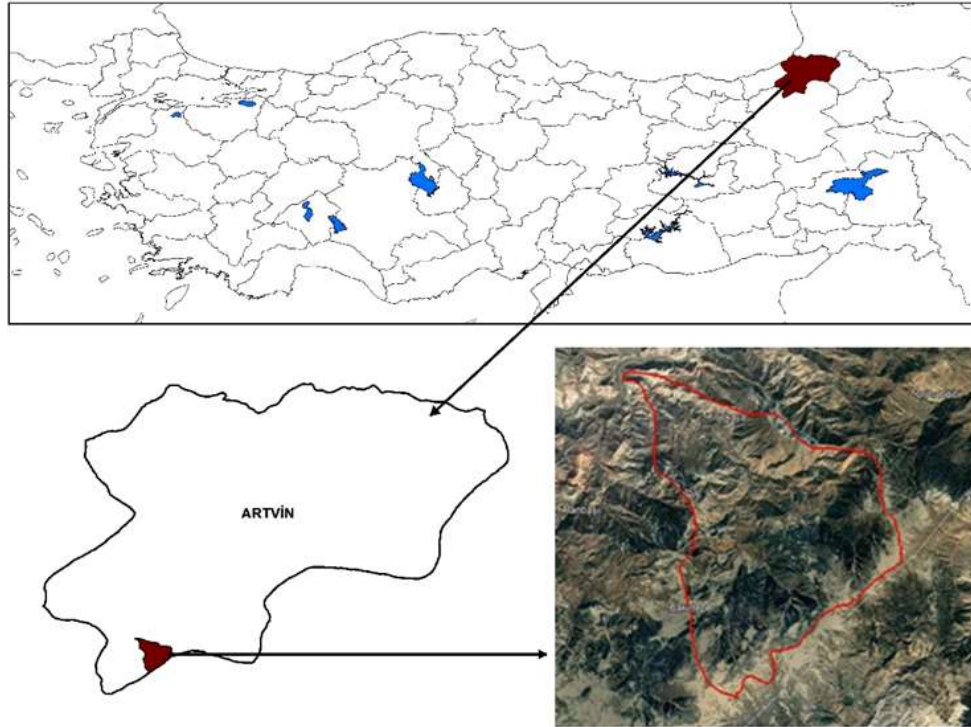


Figure 1. Map of the study area.

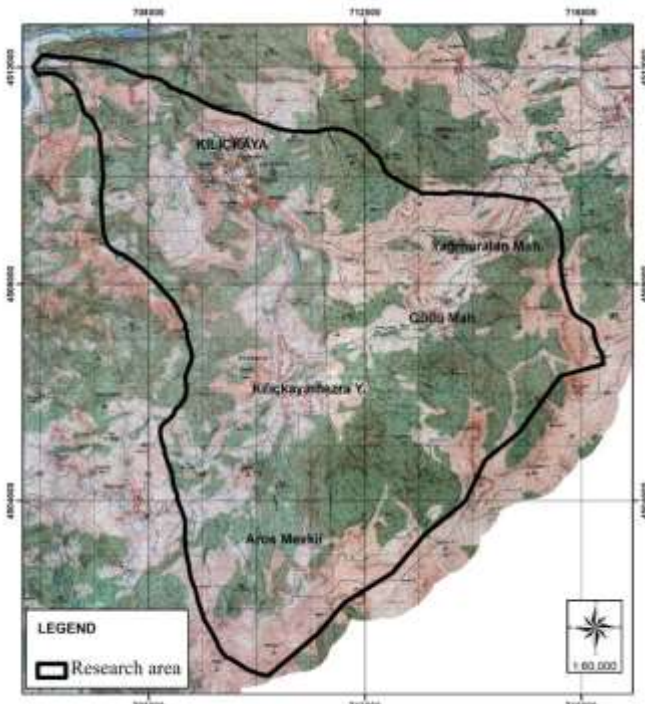


Figure 2. Topographic map of the study area.

Climatological data of the study area were obtained from Yusufeli meteorological station (DMİ 2019). According to this data, the mostrainy month is October and average precipitation is 275.4 mm and average temperature is 14.13 °C in the area (Table 1). Winter is the rainiest season, while summer is the driest season due to highest temperature in the region (Figure 3).

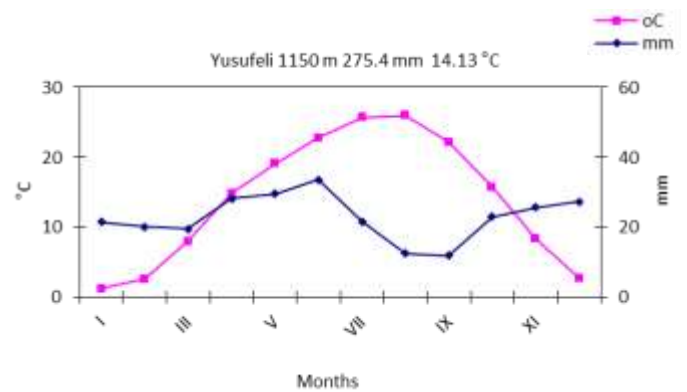


Figure 3. Climatic diagram of Artvin (Walter 1956).

## MATERIAL AND METHOD

Approximately 2000 plant specimens were collected from 25 localities in different vegetation periods between 2014-2015 (Table 1). About five plant specimens belong to Pteridophyta and Spermatophyta (Magnoliophyta) sections were taken from each plant. After identifications, all specimens were stored in the Artvin Coruh University Herbarium (ARTH).

In order to determine the endemic and rare plants, floristic studies were carried out in 2014 and 2015. All aerial (e.g., fruit, flower, leaf, fond) and subterranean plant parts (e.g., rhizome, tuber, bulb, corm) required for recognition and diagnosis were collected carefully.

Location, growing habitat elevation and collection date of plant samples were recorded. Plant specimens from the study area were dried according to the standard herbarium techniques. Identification of samples were performed with the Flora of Turkey and the East Aegean Islands (Davis 1965-1982, Davis et al. 1988, Güner et al. 2012) and Flora USSR (Komarov 1934-78), Flora Kavkaza (Grossheim 1939-1967), Akkemik (2018), Eminağaoğlu (2012, 2015) and diagnosed with a binocular stereo zoom microscope, then affixed on herbarium sheets and labelled. Other related literature (Eminağaoğlu 2002, 2009, Eminağaoğlu and Anşin 2002, 2003, 2004, Eminağaoğlu and Akpulat 2010, Eminağaoğlu et al. 2007, 2018) concerning the rare and endemic plant species of

**Table 1.** Research area stations of collected plants

No	Locality records	No	Locality records
L1	40°44'28 N, 41°28'40 E, 686m.	L14	40°42'46 N, 41°29'10 E, 1294m
L2	40°44'01 N, 41°28'22 E, 773m.	L15	40°43'02 N, 41°29'12 E, 1337m
L3	40°44'10 N, 41°27'52 E, 681m	L16	40°43'13 N, 41°29'16 E, 1420m
L4	40°44'11 N, 41°27'10 E, 692m	L17	40°43'23 N, 41°29'23 E, 1517m
L5	40°44'29 N, 41°26'39 E, 707m	L18	40°43'39 N, 41°29'16 E, 1393m
L6	40°43'54 N, 41°26'46 E, 762m	L19	40°42'09 N, 41°20'44 E, 1313m
L7	40°44'35 N, 41°26'28 E, 778m	L20	40°42'14 N, 41°29'22 E, 1218m
L8	40°43'59 N, 41°27'01 E, 897m	L21	40°42'11 N, 41°29'02 E, 1312m
L9	40°43'49 N, 41°27'17 E, 937m	L22	40°42'27 N, 41°28'15 E, 1374m
L10	40°43'39 N, 41°27'49 E, 1060m	L23	40°40'41 N, 41°32'24 E, 1961m
L11	40°43'44 N, 41°28'30 E, 1043m	L24	40°39'53 N, 41°31'59 E, 2474m
L12	40°43'23 N, 41°28'22 E, 1131m	L25	40°39'37 N, 41°31'56 E, 2723m
L13	40°43'27 N, 41°28'42 E, 1158m		

Artvin were determined. The validity of endemic plant names was checked mainly from The Plant List Version 1.1 (2020), IPNI (2020) and Hassler (2020). Risk categories were checked using IUCN (2020) and Red List of The Endemic Plants of The Caucasus (Ekim et al. 2014). The IUCN abbreviations (EN: Endangered, LC: Least concern, NE: Not Evaluated, NT: Near threat, VU:Vulnerable) is given for endemic and rare species in the text.

## RESULTS

Consequently, a total of 511 taxa belong to, 334 genera from 89 families were determined in the study area. 18 of them belonging to Pteridophyta and the others 492 plant species were Magnoliophyta. Pinophytina is consist of 7 taxa and Magnoliophytina is 485 taxa (Table 2). Floristic list of this study is given Appendix 1.

**Table 2.** The dispersion of taxa into the large taxonomical groups

	Family	Genus	Species	Subsp.	Var.	Taxon	Endemic
Lycopodiophyta	1	1	1	-	-	1	-
Pteridophyta	9	9	17	1	-	18	-
Magnoliophyta	79	324	421	53	18	492	28
-Pinophytina	2	4	3	2	2	7	-
-Magnoliophytina	77	320	418	51	16	485	28
Total	89	334	439	54	18	511	28

IUCN threat categories of endemic and nonendemic plant species were evaluated (Ekim et al. 2014, IUCN 2020). The total endemism ratio is 5.47%, with 28 taxa (Table 3).

It has been determined that 28 (5.47%) of these taxa are endemic and 32 (6.26%) are rare. Taxa names, families, threat categories and phytogeographic regions of them are given in Table 3. The distribution of endemic taxa into threat categories are as follows: EN (4 taxa), VU (1 taxa), NT (2 taxa), LC (6 taxa), NE (15 taxa) and the threat categories of rare plants that are non-endemic are as follows: EN (2 taxa), VU (3 taxa), LC (27 taxa). The

phytogeographical regions of endemic and rare plants are as follows: 161 taxa (31.5%) Euro-Siberian, 17 taxa (3.3%) Mediterranean, 81 taxa (11.9%) Irano-Turanian and 423 taxa (55.15%) are cosmopolitan and/or their phytogeographical regions are unknown (Table 3).

Poaceae (12.13%), Asteraceae (11.15%), Rosaceae (5.87%), Fabaceae (5.47%), Lamiaceae (5.08%) are the largest families (Table 4), and Poa, Trifolium, Geranium, Veronica, Epilobium and Salix are the largest genera in the study area (Table 5).

**Table 3.** Phytogeographic region and IUCN categories of endemic and non-endemic taxa (IUCN, 2020).

Phytogeographic Region	Endemic		Non Endemic		Total	
	Taxon number	%	Taxon number	%	Taxon number	%
Euro Sib.	6	1.17	155	30.3	161	31.2
Ir-Tur.	17	3.5	64	12.5	81	15.8
Medit.	1	0.2	16	3.13	17	3
Cosmop. and other	3	0.6	261	51	264	51
<b>Total</b>	<b>28</b>	<b>5.47</b>	<b>453</b>	<b>94.53</b>	<b>511</b>	<b>100</b>
<b>Endangered (EN)</b>	4	0.8	2	0.4	6	1.2
<b>Vulnerable (VU)</b>	1	0.2	3	0.6	4	0.8
<b>Near Threatened (NT)</b>	2	0.4	-	-	2	0.4
<b>Least Concern (LC)</b>	6	1.2	27	5.3	33	
<b>Not Evaluated (NE)</b>	15	2.9			15	2.9
Total	28	5.5	32	6.3	60	11.8

**Table 4.** Numerical distribution of the genera and taxa according to families

Family	Genera	(%)	Taxa	(%)
<i>Asteraceae</i>	39	11.7	57	11.15
<i>Poaceae</i>	34	10.2	62	12.13
<i>Rosaceae</i>	17	5.1	30	5.87
<i>Apiaceae</i>	17	5.1	20	3.91
<i>Brassicaceae</i>	17	5.1	20	3.91
<i>Fabaceae</i>	16	4.8	28	5.47
<i>Lamiaceae</i>	16	4.8	26	5.1
<i>Boraginaceae</i>	14	4.2	17	3.3
<i>Caprifoliaceae</i>	7	2.1	9	1.8
<b>Others</b>	157		242	

**Table 5.** Numerical distribution of the taxa according to Genera

Genera	Taxa	%
<i>Poa</i>	9	1.8
<i>Trifolium</i>	7	1.4
<i>Geranium</i>	6	1.2
<i>Veronica</i>	6	1.2
<i>Epilobium</i>	6	1.2
<i>Salix</i>	6	1.2
<i>Salvia</i>	5	0.95
<i>Campanula</i>	5	0.95
<i>Festuca</i>	5	0.95
<i>Psephellus</i>	5	0.95
<i>Sorbus</i>	5	0.95
<b>Others</b>	451	87.25

**Table 6.** IUCN risk categories of endemic and non-endemic rare plants.

No	Subfamily	Family	Taxa	Local Names	Endemism	Risk Categories	Phytogeographical Regions
1	Pteridophyta	Dryopteridaceae	<i>Dryopteris pseudomas</i> (Woll.) Holub & Pouzar (syn. <i>Dryopteris abbreviata</i> (DC.) Newman	Yaylapiluncu	Non Endemic	LC*	unknown
2			Pteridaceae	<i>Adiantum capillus-veneris</i> L.	Baldırıkara	Non Endemic	LC*
3	Magnoliophyta	Apiaceae	<i>Bupleurum schistosum</i> Woronow	Deli Şeytanayağı	Endemic	EN*	Irano-Turanian
4			<i>Heracleum sphondylium</i> L. subsp. <i>cyclocarpum</i> (C. Koch) Davis	Çemberkoçuk	Non Endemic	LC*	Euro-Siberian (Euxine)
5		Asteraceae	<i>Cirsium caucasicum</i> (Adams) Petrak	Kobuk	Non Endemic	VU**	Euro-Siberian (Euxine)
6			<i>Psephellus appendicigerus</i> (K. Koch) Wagenitz	Ovittülübaşı	Endemic	EN*	Euro-Siberian (Euxine)
7			<i>Psephellus pecho</i> (Albov) Wagenitz	Yartülübaşı	Endemic	EN*	Euro-Siberian (Euxine)
8			<i>Psephellus taochius</i> Sosn.	Sarıtülübaş	Endemic	EN*	Irano-Turanian
9			<i>Tragopogon aureus</i> Boiss.	Sarıyemlik	Endemic	NE*	Euro-Siberian
10		Betulaceae	<i>Betula pendula</i> Roth.	Huşağacı	Non Endemic	LC*	unknown
11			<i>Carpinus orientalis</i> Mill.	Istriç	Non Endemic	LC*	unknown
12			<i>Carpinus betulus</i> L.	Gürgen	Non Endemic	LC*	unknown
13			<i>Ostrya carpinifolia</i> Scop.	Firek	Non Endemic	LC*	Mediterranean
14		Boraginaceae	<i>Alkanna cordifolia</i> C.Koch	Yüreklihavaciva	Endemic	LC**	Mediterranean
15			<i>Moltkia aurea</i> Boiss.	Sarıkesen	Endemic	LC**	Irano-Turanian
16		Brassicaceae	<i>Hesperis isatidea</i> (Boiss.) D.A.German & Al-Shehbaz (syn. <i>Tchihatchewia isatidea</i> Boiss.)	Allıgelin	Endemic	NE*	Irano-Turanian
17		Caprifoliaceae	<i>Knautia tatarica</i> (L.) Szabó (syn. <i>Knautia montana</i> (Bieb.) DC.)	Dağşeşekkulağı	Non Endemic	EN**	Euro-Siberian
18		Convolvulaceae	<i>Convolvulus pseudoscammonia</i> C. Koch.	Sarıyayılğanı	Endemic	NE*	Irano-Turanian
19		Cupressaceae	<i>Juniperus excelsa</i> Bieb.	Bozardıç	Non Endemic	LC*	unknown
20			<i>Juniperus foetidissima</i> Willd.	Kokarardıç	Non Endemic	LC*	unknown
21			<i>Juniperus oxycedrus</i> L. subsp. <i>oxycedrus</i>	Katranardıç	Non Endemic	LC*	unknown
22		Cyperaceae	<i>Cyperus glaber</i> L.	Kösnüotu	Non Endemic	LC*	unknown
23		Fabaceae	<i>Astragalus aduncus</i> Willd. (Syn. <i>Astragalus xylobasis</i> Freyn et Bomm.)	Kemaliyegeveni	Endemic	NE*	Irano-Turanian
24			<i>Astragalus pendulus</i> DC. (Syn. <i>Astragalus campylosema</i> Boiss.)	Sırıkkeveni	Endemic	NE*	Irano-Turanian
25			<i>Genista aucheri</i> Boiss.	Bayırborcağı	Endemic	NE*	Irano-Turanian
26			<i>Lathyrus woronowii</i> Bomm.	Çarşakburcağı	Endemic	NE*	Euro-Siberian (Euxine)
27		Fagaceae	<i>Onobrychis stenostachya</i> Freyn	Başakkorunga	Endemic	NE*	unknown
28			<i>Quercus macranthera</i> Fisch. & C.A.Mey. ex Hohen. subsp. <i>sypirensis</i> (K.Koch) Menitsky	İspirmeşesi	Endemic	NE*	unknown
29		Gentianaceae	<i>Centaurium erythraea</i> Rafn. subsp. <i>erythraea</i>	Kırmızıkantaron	Non Endemic	LC*	Euro-Siberian
30			<i>Swertia iberica</i> Fisch. ex C.A.Mey.	Safraca	Non Endemic	LC*	Euro-Siberian (Euxine)
31		Iridaceae	<i>Crocus scharojanii</i> Rupr	Yaylakovan	Non Endemic	VU**	
32			<i>Iris nezahatiae</i> Güner & H. Duman	Mavruzo	Endemic	NE*	Irano-Turanian
33		Juncaceae	<i>Juncus effusus</i> L.	Cilotu	Non Endemic	LC*	

Table 6 (Continues). IUCN risk categories of endemic and non-endemic rare plants.

No	Subfamily	Family	Taxa	Local Names	Endemism	Risk Categories	Phytogeographical Regions
34		Lamiaceae	<i>Ballota rotundifolia</i> C. Koch	İtnemnemi	Endemic	NT**	Irano-Turanian
35			<i>Lamium galactophyllum</i> Boiss. et Reuter	Sütbalıcağ	Endemic	LC**	Irano-Turanian
36			<i>Mentha longifolia</i> (L.) L.	Pünk	Non Endemic	LC*	
37			<i>Salvia huberi</i> Hedge	Meryemiye	Endemic	LC*	Irano-Turanian
38	Lythraceae		<i>Lythrum salicaria</i> L.	Hevhulma	Non Endemic	LC*	Euro-Siberian
39	Malvaceae		<i>Alcea calvertii</i> (Boiss.) Boiss.	Hıraççeği	Non Endemic	LC**	Irano-Turanian
40	Pinaceae		<i>Abies nordmanniana</i> (Stev.) Spach subsp. <i>nordmanniana</i>	Kafkas Göknaı	Non Endemic	LC*	Euro-Siberian (Euxine)
41	Plantaginaceae		<i>Linaria corifolia</i> Desf.	Tarlanevrüzotu	Endemic	NE*	Irano-Turanian
42			<i>Linaria genistifolia</i> (L.) Mill. subsp. <i>confertiflora</i> (Boiss.) Davis	Çoknevrüzotu	Endemic	NE*	Irano-Turanian
43	Poaceae		<i>Aegilops tauschii</i> Cosson	Tespihbuğdayı	Non Endemic	EN*	Irano-Turanian
44			<i>Alopecurus aequalis</i> Sobol	Kınalı tilkikuyruğu	Non Endemic	LC*	Euro-Siberian
45			<i>Bromus armenus</i> Boiss.	Acemkılcanı	Endemic	NT**	Irano-Turanian
46			<i>Festuca artvinensis</i> Markgr.-Dann	Livaneyumağı	Endemic	NE*	Euro-Siberian (Euxine)
47			<i>Helictotrichon argaeum</i> (Boiss.) Parsa	Erceyulaf	Endemic	NE*	Irano-Turanian
48			<i>Poa annua</i> L.	Salkımotu	Non Endemic	LC*	
49			<i>Phalaris arundinacea</i> L.	Kanyaş	Non Endemic	LC*	
50			<i>Phleum alpinum</i> L.	Alpitkuyruğu	Non Endemic	LC*	Euro-Siberian
51			<i>Poa angustifolia</i> L.	Darsalkımotu	Non Endemic	LC*	
52			<i>Poa caucasica</i> Trin.	Kafsalkımı	Non Endemic	VU**	Euro-Siberian (Euxine)
53			<i>Polypogon viridis</i> (Govan) Breistr.)	Tüylüceot	Non Endemic	LC*	Euro-Siberian
54	Primulaceae		<i>Androsace armeniaca</i> Duby var. <i>macrantha</i> (Boiss. & A. Huet.) Martelli	Dağarincası	Endemic	LC**	Irano-Turanian
55			<i>Primula auriculata</i> Lam.	Felçotu	Non Endemic	LC*	Irano-Turanian
56	Rosaceae		<i>Sorbus caucasica</i> Zinserl var. <i>yaltirikii</i> Gökşin	Üvez	Endemic	NE*	
57	Rubiaceae		<i>Galium margaceum</i> Ehrend. & Schönb.-Tem	Samaniplikçiğ	Endemic	LC**	
58	Salicaceae		<i>Salix excelsa</i> J. F. Gmelin	Boylusöğüt	Non Endemic	LC*	Irano-Turanian
59			<i>Salix alba</i> L.	Aksöğüt	Non Endemic	LC*	
60	Sapindaceae		<i>Acer cappadocicum</i> Gleditsch subsp. <i>divergens</i> (K.Koch ex Pax) A.E.Murray	Çoruh akçağacı	Endemic	VU*	Euro-Siberian (Euxine)

\*: IUCN (2020), \*\*: Güner et al. (2012)

The families with the most endemic taxa in the study area are, Fabaceae (5), Asteraceae (4) Poaceae (3), Plantaginaceae (2) and Lamiaceae (2).

## DISCUSSION AND CONCLUSION

As a result of this study, the floristic structure, endemic and rare species of Kılıçkaya region (Yusufeli, Artvin) were determined. Totally, 511 plant taxa were identified. Flora

of Turkey is represented by 4.2% in this study. In Turkey, 3649 taxa are endemic and the rate of endemism is 31.82% (Güner et al. 2012). About 300 taxa in the Euro-Siberian phytogeographic region (Ekim et al. 2000) and 220 taxa are endemic for the Eastern Black Sea Region and the rate of endemism is 9.8% (Anşin 1982). The 28 taxa determined in the study area are endemic and the rate of endemism is 5.47%.

In Table 7, the percentages and taxa numbers of the five families with the most species were given. The first five families with the most taxa in family ranking are Poaceae

12.13 % (62 taxa), Asteraceae 11.15% (57 taxa), Rosaceae 5.87 % (30 taxa), Fabaceae 5.47% (28 taxa) and Lamiaceae 5.1% (26 taxa). It has given close results for 5 families in the studies conducted in the eastern Black Sea region (Anşin 1979, Ocakverdi 2001, Eminağaoğlu and Anşin 2003, Eminağaoğlu et al. 2004, 2007, 2008, 2015, Eminağaoğlu and Aksu 2015, Eminağaoğlu et al. 2018). Because of similar habitats, studies on the nearer place Karadağ and Barhal show the most similar results with our study (Eminağaoğlu and Aksu 2015, Eminağaoğlu et al. 2018).

**Table 7.** Comparison of 5 families containing the most taxa with studies conducted in close regions (%). 1. Current study, 2. Eminağaoğlu et al. (2018), 3. Eminağaoğlu et al. (2015), 4. Eminağaoğlu and Aksu (2015), 5. Eminağaoğlu et al. (2008), 6. Eminağaoğlu et al. (2007), 7. Eminağaoğlu et al. (2004), 8. Ocakverdi (2001), 9. Anşin (1979).

Families	Taxa	Poaceae	Asteraceae	Rosaceae	Fabaceae	Lamiaceae
1. Kılıçkaya	511	12.13	11.15	5.87	5.47	5.08
2. Karadağ	493	11.2	12.2	4.3	6.5	5.7
3. Artvin	2727	7.15	13.6	5.2	7.44	5.9
4. Barhal	593	10.1	11	5.7	4.7	5.2
5. Camili	990	7	11.5	6	6	4.3
6. Borçka -Karagöl	963	7	11.5	6.1	6	4.5
7. Karagöl-Shara	872	7	10.2	6.5	8.9	5.9
8. Kısır Dağı	577	7.3	16.8	5.7	7.3	5.7
9. Trabzon- Meryemana	578	4.0	8.9	5.6	8.1	4.7

The endemism ratio and phytogeographical distribution of taxa were given in Table 8. In our study, this distribution of taxa is as follows: 161 taxa (31.2%) Euro-Siberian, 17 taxa (3%) Mediterranean, 81 taxa (15.8%) Irano-Turanian and 264 taxa (51%) are the cosmopolitan and/or their phytogeographical regions are unknown (Table 8). In all floristic studies previously conducted in Artvin and nearer area, the Euro-Siberian elements are in the first place and the ratio in all studies is found to be between 22.3 –48.9 % (Anşin 1979, Ocakverdi 2001, Eminağaoğlu and Anşin, 2003, Eminağaoğlu et al. 2007,

Eminağaoğlu et al. 2015, Eminağaoğlu and Aksu 2015c, Eminağaoğlu et al. 2008, Eminağaoğlu et al. 2004) (Table 8).

The main reason for the low endemism ratio observed in this study is the climatic and environmental similarities between Caucasian flora and the study area. Similar results were obtained from other floristic studies in the Eastern Black Sea region of Turkey as seen Table 8 (Anşin, 1979, Eminağaoğlu and Anşin 2003, 2004).

**Table 8.** The phytogeographical distribution of the taxa (%) in the present study and the other studies. 1. Present study, 2. Eminağaoğlu et al. (2018), 3. Eminağaoğlu et al. (2015), 4. Eminağaoğlu and Aksu (2015), 5. Eminağaoğlu et al. (2008), 6. Eminağaoğlu et al. (2007), 7. Eminağaoğlu et al. (2004), 8. Ocakverdi (2001), 9. Anşin (1979).

Studies	Taxa	Euro-Sib.	Ir-Tur.	Medit.	Cosm. and others	Endemism
1. Kılıçkaya	511	31.2	15.8	3	51	5.47
2. Karadağ	493	26.4	18.9	4.9	49.8	8.1
3. Artvin	2727	22.3	13.3	1.7	62.5	7.2
4. Barhal	593	39.6	7.6	1.9	50.9	7.1
5. Camili	990	48.2	3.5	1.9	46.4	2.3
6. Borçka -Karagöl	963	48.9	2	2	47.1	1.1
7. Karagöl-Shara	872	39.4	10.3	1.2	49.1	6.3
8. Kısır Mountain	577	22.3	22.5	-	14.4	5.5
9. Trabzon- Meryemana	578	22,3	22.5	-	55.2	5.4

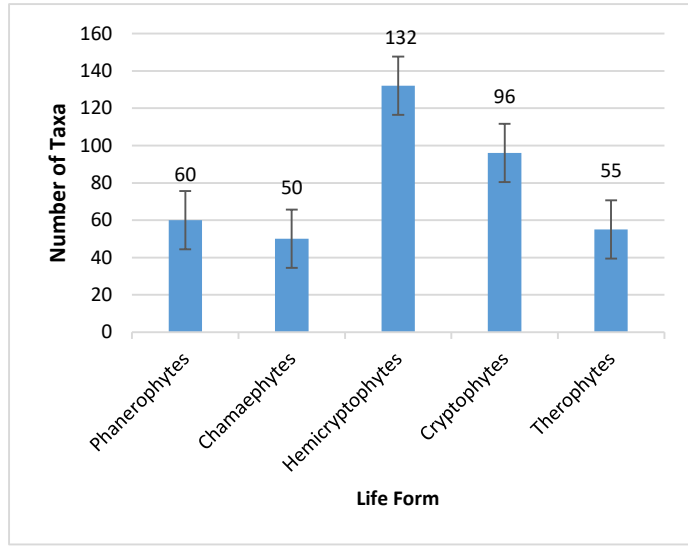


Figure 4. Raunkiaer Life form classification (1934).

Kılıçkaya is a region known for its plant richness and but different threat factors effect them in the area, road construction, investment projects, dam construction and mining. Subalpine and alpine meadows in the area are used as a barracks and plateaus by the local people. Continuing the tradition of plateauing, and there is an excessive grazing of animals. This irregular and overgrazing causes the natural balance to deteriorate and the pasture areas to lose their value in this balance. This plant area needs to be under control and to be monitored.

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