Flora of Kılıçkaya Village (Yusufeli-Artvin, Turkey)

Kılıçkaya (Yusufeli/Artvin, Türkiye)’nün florası

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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.

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 Poo, 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 ilçesi, Kılıçkaya civarında yayılış gösteren iletim demeti bitkiler 2014 ve 2015 yılları arasında araştırılmıştır. İncelenen alanda, 89 familya ve 334 cinse ait toplam 511 bitki takımdan 18 Pteridophytes ve 492 Magnoliophytes tespit edilmiştir. Magnoliophytes takimda 7 Pinophytina ve 485 Magnoliophytina takişındadır. Poaceae (12.13%), Asteraceae (11.15%), Rosaceae (5.87%), Fabaceae (5.47%), Lamiaceae (5.08%) aileleri, Poo, Trifolium, Geranium, Veronica, Epilobium ve Salix cinsleri ise estudio alandındaki en büyük cinslerdir. Çalışma alanından belirlenen en fazla tür sahip familyalar Poaceae (%12.13), Asteraceae (%11.15), Rosaceae (%5.87), Fabaceae (%5.47), Lamiaceae (%5.08) ve en fazla tür sahip cinsler Poo, Trifolium, Geranium, Veronica, Epilobium ve Salix’dir. Endemiz oranı %5.47 (28 takson’dir). IUCN Kırmızı Listesi sınıflarına göre 50 taksonun tehlike kategorileri değerlendirilmiştir.
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 km² and Kılıçkaya (Ersis) village is surrounded by Ormandibi, Çetikdüzü, 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 Agean 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 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 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°44´54 N, 41°26´46 E, 672m | L19 | 40°42´09 N, 41°20´44 E, 1218m |
| L7 | 40°44´35 N, 41°26´28 E, 778m | L20 | 40°42´14 N, 41°29´22 E, 1218m |
| L8 | 40°44´59 N, 41°27´01 E, 897m | L21 | 40°43´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 | | |

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 |
| Mediterr.              | 1 | 0.2 | 16 | 3.13 | 17 | 3.3 |
| Cosmop. and other      | 3 | 0.6 | 261 | 51 | 264 | 51 |
| Total                  | 28 | 5.47 | 453 | 94.53 | 511 | 100 |
| Endangered (EN)        | 4 | 0.8 | 2 | 0.4 | 6 | 1.2 |
| Vulnerable (VU)        | 1 | 0.2 | 3 | 0.6 | 4 | 0.8 |
| Near Threatened (NT)   | 2 | 0.4 | - | - | 2 | 0.4 |
| Least Concern (LC)     | 6 | 1.2 | 27 | 5.3 | 33 |
| Not Evaluated (NE)     | 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 | (%) |
|--------------|--------|-----|------|-----|
| Asteraceae   | 39     | 11.7| 57   | 11.15 |
| Poaceae      | 34     | 10.2| 62   | 12.13 |
| Rosaceae     | 17     | 5.1 | 30   | 5.87 |
| Apiaceae     | 17     | 5.1 | 20   | 3.91 |
| Brassicaceae | 17     | 5.1 | 20   | 3.91 |
| Fabaceae     | 16     | 4.8 | 28   | 5.47 |
| Lamiaceae    | 16     | 4.8 | 26   | 5.1 |
| Boraginaceae | 14     | 4.2 | 17   | 3.3 |
| Caprifoliaceae | 7   | 2.1 | 9    | 1.8 |
| Others       | 157    |     | 242  |     |

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

| Genera | Taxa | % |
|--------|------|---|
| Poa    | 9    | 1.8 |
| Trifolium | 7   | 1.4 |
| Geranium | 6   | 1.2 |
| Veronica | 6   | 1.2 |
| Epilobium | 6   | 1.2 |
| Salix   | 6    | 1.2 |
| Salvia  | 5    | 0.95 |
| Campanula | 5  | 0.95 |
| Festuca | 5    | 0.95 |
| Psephellus | 5  | 0.95 |
| Sorbus  | 5    | 0.95 |
| Others  | 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 | Dryopteris pseudomas (Woll.) Holub & Pouzar (syn. Dryopteris abbreviata (DC.) Newman | Yaylapılıncu | Non Endemic | LC* | unknown |
| 2  | Pteridophyta | Adiantum capillus-veneris L. | | Baldırıkara | Non Endemic | LC* | |
| 3  | Magnoliophyta | Apioaceae | Bupleurum schistosum Woronow | Deli Şeytanayağı | Endemic | EN* | Irano-Turanian |
| 4  | Magnoliophyta | Apiaceae | Heracleum sphondylium L. subsp. cyclocarpum (C. Koch) Davis | Çemberkoçuk | Non Endemic | LC* | Euro-Siberian (Euxine) |
| 5  | Magnoliophyta | Apiaceae | Cirsium caucasicum (Adams) Petrak | Kobuk | Non Endemic | VU** | Euro-Siberian (Euxine) |
| 6  | Magnoliophyta | Apiaceae | Peucedanum officinale (L.) Boiss. | Ovittülübaşı | Endemic | EN* | Euro-Siberian (Euxine) |
| 7  | Magnoliophyta | Apiaceae | Peucedanum chrysanum L. | Yartılıbaşı | Endemic | EN* | Euro-Siberian (Euxine) |
| 8  | Magnoliophyta | Apiaceae | Pimpinella saxifraga L. | Şantılıbaş | Endemic | EN* | Irano-Turanian |
| 9  | Magnoliophyta | Apiaceae | Tragopogon pratensis L. | Safraca | Endemic | NE* | Euro-Siberian |
| 10 | Magnoliophyta | Apiaceae | Betula pendula Roth. | Huşağıç | Non Endemic | LC* | unknown |
| 11 | Magnoliophyta | Apiaceae | Carpinus orientalis Mill. | Istriç | Non Endemic | LC* | unknown |
| 12 | Magnoliophyta | Apiaceae | Carpinus betulus L. | Gürgen | Non Endemic | LC* | unknown |
| 13 | Magnoliophyta | Apiaceae | Ostrya carpinifolia Scop. | Firek | Non Endemic | LC* | Mediterranean |
| 14 | Magnoliophyta | Boraginaceae | Alkanna tetraphylla L. | Yüreklıhavacık | Endemic | LC** | Mediterranean |
| 15 | Magnoliophyta | Brassicaceae | Brassica campestris L. | Sarıkesen | Endemic | LC** | Irano-Turanian |
| 16 | Magnoliophyta | Brassicaceae | Brassica napus L. | Alligelin | Endemic | NE* | Irano-Turanian |
| 17 | Magnoliophyta | Caprifoliaceae | Knautia tatarica (L.) Szabo | Dağeşekkulağı | Non Endemic | EN** | Euro-Siberian |
| 18 | Magnoliophyta | Convolvulaceae | Convolvulus pseudocommona C. Koch. | Sarıyaylğanı | Endemic | NE* | Irano-Turanian |
| 19 | Magnoliophyta | Cupressaceae | Juniperus excelsa Bieb. | Bozardış | Non Endemic | LC* | unknown |
| 20 | Magnoliophyta | Fabaceae | Astragalus speciosus Willd. | Kökarardış | Non Endemic | LC* | unknown |
| 21 | Magnoliophyta | Fabaceae | Astragalus aduncus Willd. | Katranardığı | Non Endemic | LC* | unknown |
| 22 | Magnoliophyta | Fabaceae | Cyperus glaber | Kösnüotu | Non Endemic | LC* | unknown |
| 23 | Magnoliophyta | Fabaceae | Cirsium caucasicum (Adams) Petrak | Kösküntaro | Endemic | NE* | Irano-Turanian |
| 24 | Magnoliophyta | Fabaceae | Astragalus pendulus DC. (Syn. Astragalus campylosoma Boiss.) | Sırıkgeveni | Endemic | NE* | Irano-Turanian |
| 25 | Magnoliophyta | Fabaceae | Genista aequalis Boiss. | Bayıbırcagı | Endemic | NE* | Irano-Turanian |
| 26 | Magnoliophyta | Fabaceae | Lathyrus calmus L. | Čarşakburçağı | Endemic | NE* | Euro-Siberian (Euxine) |
| 27 | Magnoliophyta | Fabaceae | Onobrychis tenuisaca Freyn | Başakkoruna | Endemic | NE* | unknown |
| 28 | Magnoliophyta | Fabaceae | Quercus macranthera Fisch. & C.A.Mey. ex Hohen. subsp. sasaportensis (C.Koch) Menitsky | İspırmişesi | Endemic | NE* | unknown |
| 29 | Magnoliophyta | Gentianacea | Gentiana lutea L. | Kırımızkartaron | Non Endemic | LC* | Euro-Siberian |
| 30 | Magnoliophyta | Gentianacea | Gentiana lutea L. | Safraca | Non Endemic | LC* | Euro-Siberian (Euxine) |
| 31 | Magnoliophyta | Iridaceae | Iridaceae | Yalılar | Non Endemic | VU** | |
| 32 | Magnoliophyta | Juncaceae | Iris nezahattae Güner & H. Duman | Mavruzo | Non Endemic | NE* | Irano-Turanian |
| 33 | Magnoliophyta | Juncaceae | Juncus effusus L. | Clotu | Non Endemic | LC* | unknown |
### 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 | Ballota rotundifolia C. Koch | İtemnemi                    | Endemic              | NT**           | Irano-Turanian   |
| 35 | Lamiaceae | Lamium galactophyllum Boiss. et Reuter | Sütbalıcak                  | Endemic              | LC**           | Irano-Turanian   |
| 36 | Lamiaceae | Mentha longifolia (L.) L. | Pünk                          | Non                   | LC*            |                |
| 37 | Lamiaceae | Salvia huberi Hedge | Meryemiye                    | Endemic              | LC*            | Irano-Turanian   |
| 38 | Lamiaceae | Lythrum salicaria L. | Hevhulma                      | Non                   | LC*            | Euro-Siberian    |
| 39 | Malvaceae | Alcea calvertii (Boiss.) Boiss. | Hıraçığı                     | Endemic              | LC**           | Irano-Turanian   |
| 40 | Pinaceae  | Abies nordmanniana (Stev.) Spach subsp. nordmanniana | Kafkas Gökñarı              | Non                   | LC*            | Euro-Siberian (Euxine) |
| 41 | Plantaginaceae | Linaria cornifolia Desf. | Tarlanevruzotu                | Endemic              | NE*            | Irano-Turanian   |
| 42 | Plantaginaceae | Linaria genistifolia (L.) Mill. subsp. confertiflora (Boiss.) Davis | Çoknevruzotu                | Endemic              | NE*            | Irano-Turanian   |
| 43 | Poaceae   | Aegilops tauschii Cosson | Tepihbuldayı                 | Non                   | EN*            | Irano-Turanian   |
| 44 | Poaceae   | Alopecurus aequalis Sobol | Kinali tilikkyruğu           | Non                   | LC*            | Euro-Siberian    |
| 45 | Poaceae   | Bromus armenus Boiss. | Acemkılıcanı                 | Endemic              | NT**           | Irano-Turanian   |
| 46 | Poaceae   | Festuca arvinensis Markgr.-Dann | Livanevruzağı               | Endemic              | NE*            | Euro-Siberian (Euxine) |
| 47 | Poaceae   | Helicotrichon argaeum (Boiss.) Parsa | Erceyulaf                   | Endemic              | NE*            | Irano-Turanian   |
| 48 | Poaceae   | Poa annua L. | Salkımotu                    | Non                   | LC*            |                |
| 49 | Poaceae   | Phalaris arundinacea L. | Kanyaş                       | Non                   | LC*            |                |
| 50 | Poaceae   | Phleum alpinum L. | Alpitkkyruğu                 | Non                   | LC*            | Euro-Siberian    |
| 51 | Poaceae   | Poa angustifolia L. | Darsalkımotu                 | Non                   | LC*            |                |
| 52 | Poaceae   | Poa caucasica Trin. | Kafaşalkımı                  | Non                   | VU**           | Euro-Siberian (Euxine) |
| 53 | Poaceae   | Polypogon viridis (Govan) Breistr. | Tüylüceot                  | Endemic              | LC*            | Euro-Siberian    |
| 54 | Primulaceae | Androsace armeniaca Duby var. macrantha (Boiss. & A. Huet.) Martelli | Dağarncası                | Endemic              | LC**           | Irano-Turanian   |
| 55 | Primulaceae | Primula auriculae Lam. | Felçotu                      | Non                   | LC*            | Irano-Turanian   |
| 56 | Rosaceae  | Sorbus caucasica Zinserl var. yaltırkılılık Gökşin | Üvez                       | Endemic              | NE*            |                |
| 57 | Rubiaceae | Galium margaceum Ehrend. & Schönb.-Tem | Samaniplikçiğ              | Endemic              | LC**           |                |
| 58 | Salicaceae | Salix excelsa J. F. Gmelin | Boylusöğüt                  | Non                   | LC*            | Irano-Turanian   |
| 59 | Salicaceae | Salix alba L. | Aksöğüt                      | Non                   | LC*            |                |
| 60 | Sapindaceae | Acer cappadocicum Gleditsch subsp. divergens (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               | Poaceae | Asteraceae | Rosaceae | Fabaceae | Lamiaceae |
|------------------------|---------|------------|----------|----------|-----------|
| 1. Kılıçkaya           | 12.13   | 11.15      | 5.87     | 5.47     | 5.08      |
| 2. Karadağ             | 11.2    | 12.2       | 4.3      | 6.6      | 5.7       |
| 3. Artvin              | 7.15    | 13.6       | 5.2      | 7.44     | 5.9       |
| 4. Barhal              | 10.1    | 11        | 5.7      | 4.7      | 5.2       |
| 5. Camili              | 7       | 11.5       | 6        | 6        | 4.3       |
| 6. Borçka -Karagöl     | 7       | 11.5       | 6.1      | 6        | 4.5       |
| 7. Karagöl-Shara       | 7       | 10.2      | 6.5      | 8.9      | 5.9       |
| 8. Kısır Dağı          | 7.3     | 16.8      | 5.7      | 7.3      | 5.7       |
| 9. Trabzon- Meryemana  | 4.0     | 8.9       | 5.6      | 8.1      | 4.7       |

The endemizm 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      |
Floristic diversity of Kılıçkaya Village (Yusufeli-Artvin, Turkey)

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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