



Flowers of Çoruh Valley

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ABSTRACT

Çoruh valley has an important biological diversity in term of plants, flora-fauna, wildlife and ecosystems. These regions contain the landraces, wild and weedy relatives, other wild, herbaceous and flowering trees, herbaceous flowering plants, medicinal and aromatic and flowering and ornamental shrubs plants species which are especially economically important plant for floriculture, eco-tourism, botanical tourism and nature tourism. Many important medicinal and aromatic and ornamental plants species are found in this region and naturally grow. It is considered that *Acantholimon*, *Achillea*, *Alkanna*, *Allium*, *Amygdalus*, *Angelica*, *Anemone*, *Anthemis*, *Arabis*, *Arctium*, *Artemisia*, *Asparagus*, *Asperula*, *Astragalus*, *Calamintha*, *Calendula*, *Calutea*, *Campanula*, *Capparis*, *Cardamine*, *Centaurea*, *Cephalanthera*, *Cephalaria*, *Chelidonium*, *Chenopodium*, *Chrysanthemum*, *Colchicum*, *Consolida*, *Coriandrum*, *Cornus*, *Coronilla*, *Cerasus*, *Cotoneaster*, *Crataegus*, *Crocus*, *Cyclamen*, *Dactylorhiza*, *Digitalis*, *Dianthus*, *Draba*, *Echinops*, *Equisetum*, *Ferula*, *Filipendula*, *Fritillaria*, *Fumaria*, *Gagea*, *Galanthus*, *Galium*, *Genista*, *Gentiana*, *Geranium*, *Geum*, *Gladiolus*, *Glychirizza*, *Helichrysum*, *Hesperis*, *Hypericum*, *İnula*, *İris*, *Isatis*, *Juniperus*, *Lilium*, *Linaria*, *Linum*, *lysimachia*, *Malus*, *Malva*, *Marrubium*, *Melissa*, *Mentha*, *Micromeria*, *Morina*, *Muscari*, *Mysotis*, *Narcissus*, *Neotichichatchewia*, *Nepeta*, *Onobrychis*, *Orchis*, *Ornithogalum*, *Origanum*, *Paeonia*, *Papaver*, *Pedicularis*, *Peganum*, *Phelypaea*, *Platanthera*, *Plantago*, *Pilosella*, *Pelargonium*, *Potentilla*, *Polygonum*, *Polygala*, *Primula*, *Punica*, *Prunus*, *Pyrus*, *Ranunculus*, *Rhamnus*, *Rhododendron*, *Rhus*, *Rosa*, *Rubia*, *Rubus*, *Rumex*, *Salvia*, *Sambucus*, *Satureja*, *Scilla*, *Scorzonera*, *Scutellaria*, *Sedum*, *Sempervivum*, *Sideritis*, *Sophora*, *Sorbus*, *Stachys*, *Tanacetum*, *Teucrium*, *Thymus*, *Trigonella*, *Tulipa*, *Tussilago*, *Uechtriützia*, *Vaccinium*, *Verbascum*, *Verbena*, *Veronica*, *Viburnum* and *Ziziphora* species commonly found in the region may be may be evaluated economically.

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Ö Z E T

Çoruh havzası bitki, flora-fauna, yaban hayatı ve ekosistemler bakımından önemli bir biyolojik çeşitliliğe sahiptir. Bu yöre, çiçekçilik, ekoturizm ve botanik turizmi bakımından önemli olabilecek yerel çeşitler, yabani ve otsu birlikler, yabani türler, otsu ve çiçekli ağaçlar, otsu çiçekli bitkiler, tıbbi aromatik ve çiçekli ve çalmsı süs bitki türlerince zengindir. Bölgede birçok önemli tıbbi ve aromatik ve süs bitkisi türü bulunmakta ve doğal olarak yetişmektedir. Bölgede yaygın olarak yetişen *Achillea*, *Acantholimon*, *Alkanna*, *Allium*, *Amygdalus*, *Angelica*, *Anemone*, *Anthemis*, *Arabis*, *Arctium*, *Artemisia*, *Asparagus*, *Asperula*, *Astragalus*, *Calamintha*, *Calendula*, *Calutea*, *Campanula*, *Capparis*, *Cardamine*, *Centaurea*, *Cephalanthera*, *Cephalaria*, *Chelidonium*, *Chenopodium*, *Chrysanthemum*, *Colchicum*, *Consolida*, *Coriandrum*, *Cornus*, *Coronilla*, *Cerasus*, *Cotoneaster*, *Crataegus*, *Crocus*, *Cyclamen*, *Dactylorhiza*, *Digitalis*, *Dianthus*, *Draba*, *Echinops*, *Equisetum*, *Ferula*, *Filipendula*, *Fritillaria*, *Fumaria*, *Gagea*, *Galanthus*, *Galium*, *Genista*, *Gentiana*, *Geranium*, *Geum*, *Gladiolus*, *Glychirizza*, *Helichrysum*, *Hesperis*, *Hypericum*, *İnula*, *İris*, *Isatis*, *Juniperus*, *Lilium*, *Linaria*, *Linum*, *lysimachia*, *Malus*, *Malva*, *Marrubium*, *Melissa*, *Mentha*, *Micromeria*, *Morina*, *Muscari*, *Mysotis*, *Narcissus*, *Neotichichatchewia*, *Nepeta*, *Onobrychis*, *Orchis*, *Ornithogalum*, *Origanum*, *Paeonia*, *Papaver*, *Pedicularis*, *Peganum*, *Phelypaea*, *Platanthera*, *Plantago*, *Pilosella*, *Pelargonium*, *Potentilla*, *Polygonum*, *Polygala*, *Primula*, *Punica*, *Prunus*, *Pyrus*, *Ranunculus*, *Rhamnus*, *Rhododendron*, *Rhus*, *Rosa*, *Rubia*, *Rubus*, *Rumex*, *Salvia*, *Sambucus*, *Satureja*, *Scilla*, *Scorzonera*, *Scutellaria*, *Sedum*, *Sempervivum*, *Sideritis*, *Sophora*, *Sorbus*, *Stachys*, *Tanacetum*, *Teucrium*, *Thymus*, *Trigonella*, *Tulipa*, *Tussilago*, *Uechtriützia*, *Vaccinium*, *Verbascum*, *Verbena*, *Veronica*, *Viburnum* ve *Ziziphora* türleri ekonomik olarak değerlendirilebilir.

Introduction

Çoruh valley consist of Eastern Black Sea forests and North-eastern Anatolian Steppe grasslands. The Çoruh Basin is one of the most spectacular nature reserves in Turkey. Because the humid air from the Black Sea is blocked by the Kaçkar Mountains, the Çoruh Valley enjoys the benefits of the rain shadow and brilliant sunshine. The Çoruh River carves deeply down between the Kaçkar Mountains to the north and the Mescit Mountains in the south. Kaçkar Mountains and landscape value Çoruh basin, plants, wildlife and ecosystems have an important ecological richness in terms of biodiversity (Çakmakçı et al., 2009a). The river experiences a transitional climate between Black Sea's mild and wet weather and East Anatolia's cold climate. The area is divided into two main valleys, namely the Valleys of the True Coruh and the valleys brought by the side branches of the Coruh River such as Ardanuç, Ortaköy, Altıparmak, aksu and barhal. In terms of average and extreme temperatures, wide differences are also observed between regions and between village and local valley in the same region. The vegetation and plant cover is astonishingly diverse due to extreme variations in climate within a very small area. While the lush green floors of the valleys have an almost subtropical climate with rice paddies, olives, pomegranates and fig trees, the upper parts of the side valleys are covered with a mixed forest of coniferous and deciduous trees and alpine meadows. The Coruh River however shows high value in terms of biological diversity and hosts plenty of important species and habitats. The river's valley is known for its rich flora with high endemism.

The region can be roughly divided into four separate environments such as the bottom of the valley, which receive humidity from the river, the arid hills, the subalpine hills and the alpine mountains. Following the gushing streams in the side valleys, the grass is scattered with wildflowers and in the shadow of magnificent pine trees. The transition between dry hills and lush meadows is dramatic and varies from valley to valley. Steep slopes, scree and granite rocks alternate with wetlands, lush pastures and forested hills. In addition to the altitude, the number of microclimates, the soil, and the water supply of the terrain play a crucial role in the plant species growing here.

Çoruh valley contains a great variety of natural habitats, ranging from Eastern Black Sea forests, North-eastern Anatolian Steppe grasslands, Wetland ecosystems, Glacier Lake, low and high-interior mountains, from deeply incised valleys to expansive steppes, from fertile alluvial plains to arid, rocky hillslopes. In the valley, the Black Sea, Mediterranean and Central and Eastern Anatolia regions belonging to different climatic conditions can be seen together, increase the diversity of plant and animal species living here (Çakmakçı et al 2009 a). Çoruh valley is well known for its wide variation in complex topography and climate which favored the formation of different soil types, rock substrates, hydrological conditions, and habitat and vegetation zones. From pine forest to fir forest and oak forest semiarid and subhumid conditions are dominant in the valleys Çoruh. Alpine and sub-Alpine meadows cover large areas in the

higher parts of the Eastern Black Sea Mountains and in the northern and north-eastern parts of Eastern Anatolia (Anon, 2007). Due to the Coruh River itself and the geographical location of the region, the climatic characteristics of the Black Sea, Mediterranean and Central Anatolian regions coexist along the valley. The variety of climatic conditions due to the high mountain massifs, lowlands, plains, and the influence of the Euro-Siberian floristic region and Irano-Turanian floristic region; these allow various vegetation elements to occur here. Besides, ecological factors change greatly over very short distances and for these reasons living things have evolved and diversified richly and created a wealth of species. The valley is very rich in habitat diversity due to the diversity in its geomorphology, topography and climate. As a result, Çoruh valley is very rich in plant species.

There are Steppe grasslands, Forests ecosystem and in the area. Also Çoruh valley and region had low and high altitude many mountain (mountain of Kaçkar 3937 m, Altıparmak 3562 m, Dilek 3549 m, Güngörmez 3523 m, Demirdağ 3511 m, Karçal 3428 m, Deve 3363 m, Gül-Salval 3348 m, Kükürttepe 3348 m, Marsisi 3334 m, Mescit 3240 m, Arsiyan 3164 m, Sandık 3186 m, Nevse 3114, Çadır 3050 m, Kürdevan 3050 m, Asniyar 3040 m, Davut 3000 m, Parmak 3000 m, Dibe 3000 m, Kartal 3000 m, Mihrap 2950 m, Bozan 2924 m, Kop 2918 m, Niyedik 2900 m, Akrevan 2900 m, Hasan 2900 m, Gemili 2892 m, Pancarbayırı 2850 m, Arı 2850 m, Sahara 2799 m, Karyan 2790 m, Ziyaret 2752 m, Tozan 2700 m, Kargiyel 2790 m, Yassı 2500 m, Kazancık 2750 m, Ayazöldüren 2500 m, Koçdağı 2500 m, Karadağ 2399 m, and mountain of Korga 2364 m). Mountain ecosystems tend to be important for biological diversity. Isolated mountain block is often rich in endemic. Regional various geographic features, geographic differences brought about by climatic diversity, mountains, forests, springs, avenue, natural assets such as lakes and rivers; flora, fauna and canyons has a wealth of important. In the region 600-3900 m across very short distances varying extreme differences in altitude, deep valleys systems, rocky slopes, horizontally and vertically, changing vegetation structure due Coruh has a plant diversity in the world so rarely encountered and many different species grow naturally (Çakmakçı et al., 2014). The land races which maintain a high level of genetic heterogeneity are still grown in transitional zones and mountain areas where the agricultural lands are small and the modern farming in not possible (Tan, 2001).

Forests in Region include different floristic regions. These ecosystems are very important for the habitats of wild relative of crop species, such as wild relative of cereals and legumes and also wild grape and fruit species. Also forest and steppe ecosystem is perhaps the most important of all from the point of view of economics, as a large number of wild medical and aromatic crops, ornamental plants, endemic and endangered species. Wetlands display a wide variation of characteristics reflecting the diversity of climate, topography, elevation and soil conditions, and provide habitats for large numbers aquatic and halophytic species. Plateau and

alpine meadows, which is cover large areas in the regions. Çoruh valley and its surrounding mountains and its valleys are the centre of origin and/or centre of diversity of several crop plants, besides being microgene centre for some crop species. In the area is considered as minor gene centre for many of crops species (Atalay, 2002; Çakmakçı, 2004).

The Coruh basin has an important biological diversity in terms of plant, wildlife and ecosystems. This rich diversity is due to the formation of different climatic types, geographical situation, different geological and topographic structure and different soil types depending on whether the Eastern Northeast Anatolian climate and the Eastern Black Sea are located at the intersection of the sea climates. Coruh valley; many ornamental plants of natural and exotic nature have ecological characteristics appropriate to the requirements of production and growing environment. Therefore, more scientific research on the production, cultivation and use of ornamental plants should be given in our country.

Biodiversity is a set of of ecological events, genetic, species and ecosystem diversity in a region. Biological wealth is the most important factor supporting ecotourism activities in a region. The rugged areas are rich in vegetation because it creates different environmental conditions. Forms of the Earth; particularly the elevation, the direction of the mountain's extension, and the rugged areas that make up different environmental conditions affect the spread of plants; endemic species are common in high mountain peaks, deep river valleys, closed basin lakes and karstic pits where physical isolation is seen at the highest level (Atalay, 2002; Duran, 2013). Water presence, green tissue structure, plant diversity, harmony of natural colors, historical items, interesting geological formations, authentic constructions, unspoiled nature parts in a region is worth seeing and usable ecological parameters (Karafaki, 2013). The introduction of plants and their use in ecotourism activities can be important in terms of protection of these plants (Kayıkçı et al., 2012). Plant species in a region, especially geofit plant species, have a special place in ecotourism, especially due to their ostentatious flowers, smell, taste-aroma and original characteristics. The Coruh basin has an important biological diversity in terms of plant, wildlife and ecosystems. This rich diversity is due to the existence of different types of climates, geographical situation, different geological and topographic structure and different soil types due to the intersection of the continental Northeast Anatolian climate and the Eastern Black Sea marine climate. Coruh Valley has ecological characteristics suitable for the production and growth of many natural and exotic ornamental plants.

Materials and Methods

This study was carried out to determine the richness of the Coruh valley in terms of plant diversity, to evaluate these species in terms of ecological, ethnobotanical, economical and ecotourism potential and to determine the negative effects on human species. During the field studies, the distribution areas, density, economic and ecological characteristics of the plants were taken into

consideration. Between 2000 and 2015, the study material was collected and photographed during the field studies at Ardanuç, Ortaköy, Altıparmak, Aksu and Barhal valleys, Kaçkar and Mescit mountains in the Çoruh Valley and its side branches. It was discovered by the research team in 2000-2015 that the main line starting from Mescit Mountains (Bayburt) which is the longest line of Çoruh River and the streams and rivers feeding it (Aksu Stream, Barhal Stream, Oltu Stream, Ortaköy Stream, Murgul Stream, İçkale Stream and Kaynarca Stream (Verçelik: 3711 m, Kaçkar: 3932 m, Altıparmak 3562 m, Dilek 3549 m, Güngörmez 3523 m), the Eastern Black Sea mountains and the mountains in the north of Erzurum (İspir, Oltu, Tortum), Kop Mountains, Soğanlı Mountains, Artvin and Bayburt regions were screened for ecotourism and common plant species which may be economical in different areas. Davis (1965-1988), Atatürk University Science Faculty Biology Department Herbarium, Zohary and Feinbrun-Donthan (1977), Davis et al. (1988), Güner et al. (2001) and Tekin, (2007) have been utilized. Also web samples (<http://turkherb.ibu.edu.tr>) have been taken into consideration. Species that are common in the region have been identified in the field studies, taking into account the height, locality, and collection dates of the plant samples. Plant flora in the study area was periodically taken to land and samples were taken and observed in different phenological periods of the plants. During the field studies, the distribution areas and ecological characteristics of the plants were determined, the conditions of the plants were observed and these plants were evaluated in terms of ethnobotany, economic and ecotourism potential.

Results and Discussion

Çoruh valley was also home to a number of ornamental flowers, the most notable being the *Tulipa* (lale), *Paeonia* (şakayık) and *Orchis* (orkid), than after *Crocus* (çiğdem), *Centaurea*, *Cyclamen* (siklamen), *Primula* (çuhaçiçeği), *Helichrysum*, *Gentiana*, *Gladiolus* (gladyo), *Papaver* (haşhaş), *Paeonia* (şakayık), *Consolida* (hezaren), *Fritillaria* (ters lale), *Dianthus* (karanfil), *Draba* (kaya çiçeği), *Sedum* (dam kuruğu), *Taneceum* and/or *Chrysanthemum* (krizantem), *Lilium*, *Dactylorhiza* (Salep), *İris* (süsen) and *Platanthera*. Bulbous, lumpy, rhizomatic and tuberous geophiles are common in the region. These include *Anemone*, *Cyclamen*, *Allium*, *Muscari*, *Colchicum*, *Fritillaria*, *Tulipa*, *Iris*, *Gladiolus*, *Galanthus*, *Crocus*, *Narcissus*, *Orchis*, *Cephalanthera* and *Dactylorhiza* genus have a special design due to their spectacular flowers.

Similarly, in previous researches, in Bayburt, Pazaryolu, İspir and Yusufeli regions, in particular, it has been revealed that the species *Iris*, *Orchis*, *Tulipa*, *Crocus*, *Primula*, *Helichrysum*, *Gentiana*, *Gladiolus*, *Papaver*, *Consolida*, *Chrysanthemum*, *Lilium*, *Dianthus*, *Dactylorhiza* and *Rosa* species are common (Çakmakçı et al. 2009 b). It has also been reported that many ornamental plants belonging to the genus *Allium*, *Colchicum*, *Cyclamen*, *Fritillaria*, *Gagea*, *Gentiana*, *Galanthus*, *Gladiolus*, *Iris*, *Lilium*, *Orchis*, *Ornithogalum*, *Rosa*, *Scilla* and *Tulipa* are common in the region

(Çakmakçı et al., 2013). In addition, in the Çoruh basin, many *Thymus* (thyme), *Origanum* (thyme), *Satureja* (thyme), *Nepeta* sp. (catmint, taşnanesi), *Melissa* (lemon balm, oğulotu), *Menta* (mint, nane), *Salvia* (sage, adaçayı), *Rubus* (raspberry, blackberry), *Sideritis* (mountain tea, dağçayı), *Stachys* (woundwort, dağ çayı), *Capparis* (caper, kapari), *Althea* (marshmallow, hatmi) and *Hypericum* (common St. Johnswort, sarı kantaron), species are quite common.

On the other hand, in the Çoruh valley, a variety of medicinal and aromatic, flowering ornamental and visually important plants of the genus *Alchemilla* (lady's mantle aslanpençesi), *Achillea* (yarrow, civanperçemi), *Anthemis* and *Matricaria* (chamomile, papatya), *Arctium* (klette, dulavratotu dulavratotu), *Artemisia* (wormwood, astragan), *Asperula* (woodruff, belumotu), *Astragalus* (milk vetches, geven), *Borago* (borage, tibbi hodan), *Calamintha* (musk plant, tibbi miskotu), *Calendula* (marigolds yabani nergis, aynı sefa), *Cephalaria* sp. (Syrian scabious, pelemir), *Genista* (genista, boyacı katırtırnağı), *Ishatis* (woad, çivit otu), *Micromeria* (Boğumluçay, kaya yarpuzu, kaya kekiği), *Potentilla* (cinquefoils, beşparmak otu), *Reseda* (mignonette, doğu muhabbetçiçeği), *Scutellaria* (skullcaps), *Symphytum* (common comfrey or blackwort, tibbi karakafes otu), *Valeriana* (valerian, kediotu), *Verbascum* (mullein, sığır kuyruğu), *Verbana* (common vervain, tibbi mine) and *Viola* (violet, menekşe) are commonly grown.

The most famous flowers of the Çoruh basin and Kaçkar mountains are orchids, bellflowers and irises. The Çoruh basin provides the perfect growing conditions for orchids. The region is home to many kinds of *Dactylorhiza*, some species of *Orchis* and the *Cephalanthera*. *Dactylorhiza urvilleana*, *D. iberica*, *D. euxina*, *D. flavescens*, *D. osmanica*, *D. saccifera*, *D. umbrosa*, *Orchis mascula*, *O. coriophora*, *O. tridentata*, *O. purpurea*, *O. morio*, *Cephalanthera rubra*, *C. longifolia* and *Cephalanthera damasonium* are widely distributed throughout the valleys and spangle numerous high meadows and wet lawns in the mountain passages and damp grass and mountain slopes, lined up on the edges of the spring waters of the mountain slopes in plateau of basin and on the mountain pass.

The second the most beautiful bellflower are *Campanula* species, can some of which only grow under the unique climatic conditions of the Çoruh Valley and over-variant in the region. *Campanula choruhensis*, *C. troegerae*, *C. lactiflora*, *C. bononiensis* and *C. macrochlamys* are found in meadows, on the edges of the cliffs and especially in Barhal, Aksu, Değirmencik, Çamlıkaya and Sirakonaklar valleys. Other species of bellflower that grow in the region include *C. latifolia*, *C. rapunculoides*, *C. glomerata*, *C. sclerotina*, *C. collina*, *C. betulifolia*, *C. tridentate*, *C. conferta*, *C. stricta*, *C. seraglio*, *C. steveni*, *C. pontica* has important place. Also, endemic *C. axillaris*, *C. ledebouriana* and *C. saxonorum* species are also found. Of these, *C. choruhensis*, *C. C. seraglio* and *C. troegerae* species are unique only to the Coruh Valley and the distribution area is very short. Bellflower species are common in marsh and wetlands, forested areas, rocky, pebbled and arid slopes, rock surfaces, pastures, meadows and roadsides. Species such

as *Campanula troegerae* (İspir çingırağı), *Asperula virgata* ve *Lathyrus woronowii* does not grow anywhere else in the world except Coruh Valley.

The Çoruh region is famous for its many different species of *Iris* such as widespread *Iris germanica*, *Iris caucasica*, *Iris iberica*, *I. reticulata* and rare species of *Iris sibirica* and *I. pseudacorus* which flourish both in the valleys and alpine meadows. *Iris taochia*, *Iris sari* and *Iris danfordia* are the endemic species of the region's irises, which are found in distressed and rare species. It was noted that endangered status and rare species of *Iris taochia*, *Iris sari* and *Iris danfordia* are endemic to Turkey (Davis, 1982). These species are important sources that can be used for floriculture, ecological and botanical tourism.

Rosa species, which are prevalent in the region, are resistant to harsh environmental conditions (rocky, sloping, inclined places, poor soils and limiting water, etc.), which are perennial shrub plant has a height of about 1-3 m thick. Many native *Rose* species distributed in a wide range in the region. Some of these are *Rosa canina*, *R. dumalis*, *R. montana*, *R. pisiformis*, *R. iberica*, *R. hirtissima*, *R. hemisphaerica*, *R. elymaitica*, *R. micrantha*, *R. heckeliana* and *R. villosa*. The Çoruh region is famous for its many different beautiful species of *Rosa* such as widespread burnet rose (*Rosa pimpinellifolia*), yellow rose (*Rosa foetida*), *Rosa gallica*, *Rosa rugosa*, *Rosa foetida* and others. It was noted that rare species of *R. hemisphaerica* and *R. heckeliana* are endemic to Turkey (Davis, 1982). Especially, *Rosa gallica*, *Rosa rugosa* and *Rosa foetida* species can be used in parks and gardens. Çoruh valley holds a rich gene pool of rose plants in different agro-climatic regions but these resources are threatened by genetic erosion due to the drastic increase in human population.

Mountain, wooded areas, shrubs, boulders, rocky, pebbled, arid slopes, and especially the majestic red peony that is common in the peaks of the mountain skirts have different forms in the locality, the most common being the splendid red peony *Paeonia mascula* (bear rose). *Crocus biflorus ssp tauri*, *C. scharojanii*, *C. vallicola*, *C. kotschyanus ssp. suworowianus*, *C. speciosus ssp speciosus* and endemic *cichlids C. biflorus ssp artvinensis* and *C. aeriis* are grown especially in the passage areas of Kaçkarlar. *C. szovitsii*, *C. speciosum*, *C. autumnale*, *C. falcifolium* and *C. bornmuelleri*, especially in the north of the vineyard, are common in the plains and beds of the stream. Also, this region is host to many interesting wildflowers species like the sophora root (*Sophora alopecuroides*) whose cream-coloured flowers grace the sandbanks of the riverbed, nearby are the bright pink flowers of the *Pelargonium enlicherianum* and very rare species of flower of outstanding beauty are *Neotchichatchevia isatidea* and bright yellow colored *lysimachia punctata*. Dame's rocket (*Hesperis matronalis*), white flowered rock cress (*Arabis caucasica*), sky-blue speedwell (*Veronica oltensis*) and blue streak (*Veronica gentianoides*) are also found in cliff faces and granite rocks. Many tiny purple pink everlasting (*Xeranthemum annuum.*), majestic red poeny (*Paeonia mascula*) and species of yellow flax (*Linum mucronatum*), snowball (*Viburnum orientale*), *Onobrychis cornuta*,

Saponaria prostrata, *Dianthus orientalis*, *Scutellaria orientalis*, *Ornithogalum pyrenaicum*, which are also found hidden among the stones and junipers and/or on the hillsides. The region is rich in wild poppy plants. These are mainly oriental poppy (*Papaver orientalis*, *P. pseudo-orientale*, *P. bracteatum*), *P. fugax*, *P. tauricola*, *P. paucifoliatum*, *P. glaucum*, *P. rhoes*, *P. dubium*, *P. arenarium* and the endemic poppy (*Papaver laterium*) species. Light yellow oxlip (*Primula elatior* subsp. *pallasi*) and the bright yellow cowslip (*Primula veris* subsp. *columnae*), pastel purple auricula (*Primula auriculata*), the endemic cuha (*Primula longipes*), orange red avens (*Geum coccineum*) wood avens (*Geum urbanum*), dragonwort (*Polygonum bistorta*), milkweed gentian (*Gentiana asclepiadea*), spring gentian (*Gentiana verna*), pyrenean gentian (*Gentiana pyrenaica*), beautiful prickly 'dikenli güzel' (*Morina persica*), purple mountain hyacinths (*Muscari armeniacum*), Pearl hyacinth (*Muscari tenuiflorum*), luminous blue (*Muscari aucheri*), dumpy pink (*Cyclamen parviflorum*), little yellow (*Gagea glacialis*), rosebay willowherb (*Epilobium angustifolium*), the pastel violet of crown vetch (*Coronilla varia*) and *Cardamine* sp. are scattered along the banks Kaçkar mountain streams, fresh spring water edges and pass or mingle in the meadows and alpine meadows, in the passages, mixed with the meadows or on the edges of the lakes. *Fritillaria latifolia* (ağlayan gelin), *Fritillaria crassifolia*, *Anemone albana*, *Anemone narcissiflora* (narcissus anemone) and *Anemone blanda* are extremely common in alpine meadows at higher altitudes. *Gladiolus kotschyanus*, *G. atroviolaceus* and *Aquilegia alpina* species play an important role in meadow and forest openings. In the lower parts of the valleys *Alssum arvinense*, *Centaurea pecho*, *Crocus biflorus* ssp. *arvinense*, *Hypericum fissurale*, *Origanum rotundifolium* and the rare *Eryngium caeruleum* communities grow together.

Aruncus vulgaris, *Polygonatum biflorum*, *Pisum* sp.; *Ranunculus flammula* and *Ranunculus constantinopolitanus* decorating high meadows; white slippery gray hump *Dapne glomerata* and pink colored *Erigeron caucasicus*; *Uechtritzia armena*, *Lallemantia canescens*, attracting attention with its leaves and flowers; magnificent Sarizambak *Lilium szovitsianum*; delicate pink and white flowering *Polygala comosa*, *Pilosella hoppeana* and bun plant species (*Echinops pungens* and *Tanacetum* sp.) are important in the region. At the base of the Çoruh valley are the springs *Calutea cilicica*, *Chenopodium foliosum*, *Ephedra major* and *Genista sessifolia* in the river, tea and creek beds. *Verbascum*, *Vicia*, *Trifolium*, *Onobrychis*, *Geranium*, *Astragalus*, *Achillea*, *Ajuca* and *Acantholimon graceful* flowering crocodile species on the mountain slopes add to the Coruh valley their unique beauty. The red, yellow and pinkish red mountain lilies are very common in spring, while the yellow, white and blue forest rose *Rhododendron* species found in the forests of *Phelypaea coccinea* and Kacharkaru Coruh are very rare. These species are among the high plants with potential to be used as hedge plants, movement control and accentuation in urban and rural areas, as well as the aesthetic features they exhibit in different periods and different colors of flowering and leaf

beauty. Valley damk Sedum is one of the important areas of Turkey in terms of the diversity of the spruce *Sempervivum*, *Cantaurea*, sensitive silene and mostly *Draba* species growing on rock surfaces. The main reasons for this diversity are climatic differences in elevation differences, rocky slopes and deep valley systems and regions.

Various geographical features, climate diversity brought about by geographical difference, natural bridge between Black Sea and Eastern Anatolia, extreme height differences at very short distances, deep valley systems, rocky slopes, horizontal and vertical changing vegetation structure and Çoruh Vadisi having a plant variety. There are plenty of plant species in the region's rich flora to attract the attention of local and foreign tourists. At the beginning of these plants are bulbous, nodular, rhizomatous plants, medical and aromatic plants and rose species. Curiosity tourists and researchers can participate in the dissemination, conservation, promotion and related associations and private organizations of these crops. Both sides of the valley are important for botanical tourism, with high plains on the mountain ranges extending in the east-west direction, glacial lakes between the peaks and valleys, flat landscapes around the lake and behind the forest texture, natural beauty, plant diversity and alpine flora.

Plant diversity and many plant species in the region have long been under the pressure of many closely interrelated factors. In the region, there are some threats to agricultural biological diversity and steppe ecosystems, such as soil erosion, climate change, bush fire, inappropriate grazing and usage of valley and over gathering of some plants having an economical value. On the other hand, grazing which starts at the early growth stages of herbaceous plants continue throughout florescence and seed bearing and thus reduces or prevents the process of plant regeneration. Also, the very rich and interesting flora with existing bio-diversity and genetic diversity and/or natural habitats has been destroyed during the construction of dams or HES and tunnels. Construction of dams and hydroelectric power plant project (HES) and tunnels, erosion, changing local forest cover, as well as large scale uncontrolled making of road and tunnels for HES leading to destruction of biodiversity (Çakmakçı, 2004). Once the dams are in operation, natural habitats of native (drought tolerant) species will be restricted and they may be in danger of extinction in the valley (Gokturk et al., 2006). Also, places where many of these plants naturally range is covered with dam lakes nowadays and the vegetation around them is also damaged during the construction of these structures. As to the conservation state, most of the wild species in the areas have no protection. Utilization of these species in plantations may serve as conservation refugees for these species and ensure their presence in the region. Considering all these, it seems necessary to take some locations in the area under protection. As a first step in this line, Valley and Plateau, mountain lines and pass, the mountainous forest-steppe belt, secluded areas, green floors of the valleys and water banks, wetland ecosystems, glacier lake region, and hill come to the fore as locations in need of urgent protection (Özhatay et al., 2003).

There are many plant species with attractive flowers, good ground cover, dwarf or high shrubs and trees which have potential value to be used for many landscaping purposes. The important ornamental plants in commercial use are bulbous, tuberous, rhizomous plants. Since the *Galanthus*, *Fritillaria*, *Cyclamen*, *Colchicum*, *Orchis*, *Dactylorhiza*, *Gladiolus*, *Iris*, *Lilium*, *Arum*, *Allium*, *Tulipa* and *Crocus* species among them are picked directly from the nature and used, their collection should be regulated with special attention. The results of our research implies the necessity of urgent realising of the following measurements:

- To collect and conserve selected rare and endangered species and economically important plant groups
- To take immediate measures to prevent loss of habitats and species diversity
- To manage and utilize natural biological resources based on sound ecological and sustainable management principles
- The first stage of the studies in Çoruh Valley and İspir region should be the collected and characterized of landraces or natural strains and the selected and/or conserved of suitable strains
- Collection and exportation of ornamental, medicinal and aromatic plants should be arranged by special regulations
- "Institute of Regulation, Collection, Investigation, and Conservation of Genetic Resources in Çoruh Valley" and/or "Biogenetic Reserve Areas Çoruh Valley" have been constituted and accelerated without delay
- To put more emphasis on the collection and conservation of plants such as *Rosa*, *Rubus*, *Spiraea*, *Thymus*, *Ribes*, *Paeonia*, *Clematis*, *Orchis*, *Dactylorhiza*, *Iris*, *Lilium*, *Tulipa*, *Crocus*, *Cyclamen*, *Paeonia*, *Primula*, *Helichrysum*, *Gentiana*, *Gladiolus*, *Papaver*, *Consolida*, *Fritillaria*, *Dianthus* and *Chrysanthemum* as these plants occupy relatively small areas and many of them can be accommodated in the shade of tall trees or form multilayered artificial vegetations incorporating various species of trees, shrubs and herbaceous plants.
- The building of a system of reservations and national parks that includes all interesting and ecologically rich floristic and vegetational regions
- The protection of habitats with rare, endemic, and relict plants and phytocoenoses not included, for whatever reason, in the reservations, as botanical localities of special importance
- Conservation and cultivation of ornamental plants species
- Protection of endangered species
- The protection of very old trees and other unique representatives of the flora and vegetation
- The replacement of cultivated plant species and varieties in new habitats or botanical gardens
- Implementation of breeding programmes for raising the productivity of the ornamental and medicinal plants.

Plants with medical and visual prescription and especially geofit plant species have a special place and

precaution in terms of botanical and nature tourism due to their flamboyant structures. The introduction of these plants and their use in ecotourism activities is important for the protection of these plants. Many plant species found in the natural plant cover of Çoruh Valley are not used as ornamental plants in landscape designs. For the properties and beauty of flowers, leaves and fruits, it is necessary to evaluate the use possibilities of the plants which can be used as ornamental plants and to make sure that the plant variety does not become a part of the ornamental plants sector.

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