The Role and Importance of Botanical Gardens in Ex-situ Conservation of Rare Plants at Regional Scale:

A Case Study of Artvin Çoruh University Ali Nihat Gökyiğit Botanical Garden and Artvin Çoruh University Herbarium

Prof. Dr. Özgür EMİNAĞAOĞLU
Asist.Prof. Dr. Hayal AKYILDIRIM BEĞEN
Ali Nihat Gökyiğit Botanical Garden,
Artvin Coruh University, Artvin

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- 1. Introduction of Artvin District
- 2. Plant diversity in Artvin
- 3. International importance of Artvin in terms of Plant Diversity
- 4. Major threats to the Plant Diversity in the Region
- 5. Establishment of Botanical Garden

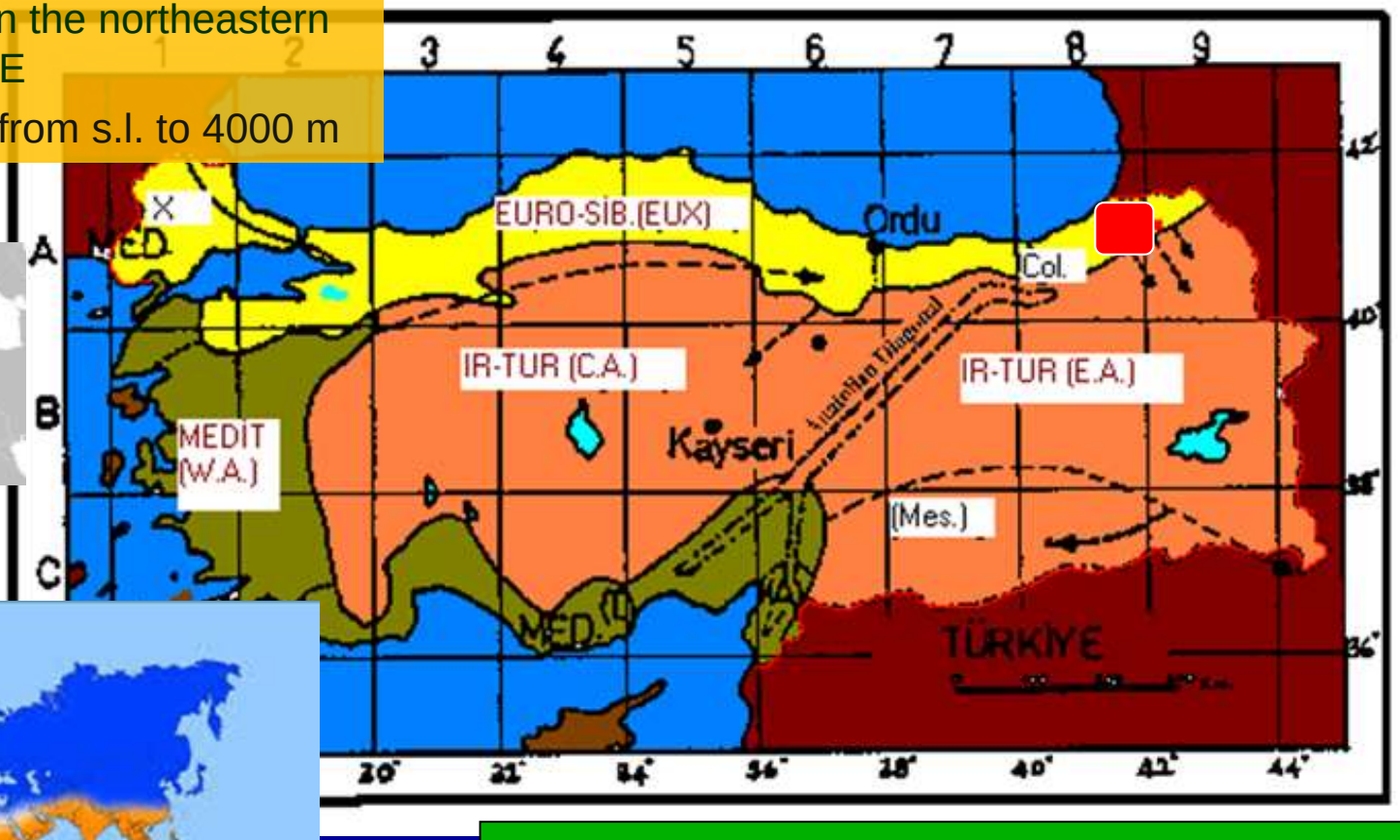
Artvin

❖It lies within the Colchic sector of Euxine provens of the Euro-Siberian floristic area in the Holarctic region

❖ The province is placed in the A8-A9 squares according to Davis's grid system

❖Artvin is located in the northeastern side of the TURKIYE

❖altitudes ranging from s.l. to 4000 m



❖Turkey has 3 phytogeographical region.

1.Europe-Sibirian,

2. Mediterranian,

3. Iran-Turanian

Climate Data's

- There are 3 types of climate in Artvin: Mediterranean, Continental and Oceanic.
  - The greatest part of the city, including much of the Çoruh Valley, comes under the influence of various types of Mediterranean climate;
  - the Continental climate occurs in Şavşat province;
  - the Oceanic climate prevails in the city bordering the Black Sea (Hopa and Arhavi).

Table 1. The average and extreme climatic values in Artvin from 1970 to 2016

	Oceanic climate			Continental	Mediterranean Climate		
	ARHAVİ	HOPA	BORÇKA	ŞAVŞAT	ARTVİN	ARDANUÇ	YUSUFELİ
Mean Temprature (^{0}C)	14	14.8	19.2	16.2	12,0	13.0	15.0
Total Rainfall (mm)	2362	2068.8	1713.4	792.8	719	446,1	295,8

Elevation difference is quite a lot in Artvin *(from s.l. to 4000 m)*

Lakes

Rich water resources *(sea, lake and stream)*

Glacial Lakes.
Yıldız lake, Borçka
(2600 m)

Lake of Rutav, Şavşat

Alpin Lake
Arsiyan Lakes
Şavşat-(2400 m)

Hidden Lake, Şavşat

Rivers and streams

Çoruh river

Oltu stream, Yusufeli

Şavşat stream, Şavşat

Barhal stream, Yusufeli

waterfall

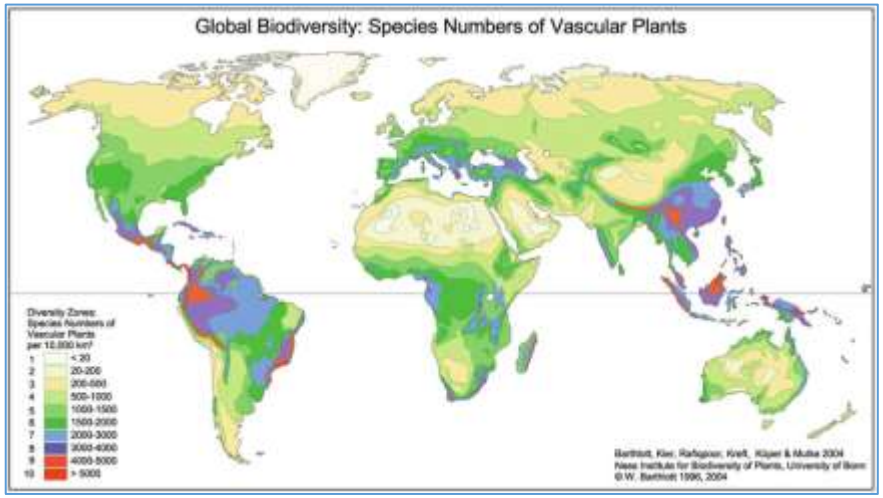
Maral Waterfall,
Borçka

Ciro Waterfall,
Yusufeli

Tamara Waterfall,
Şavşat

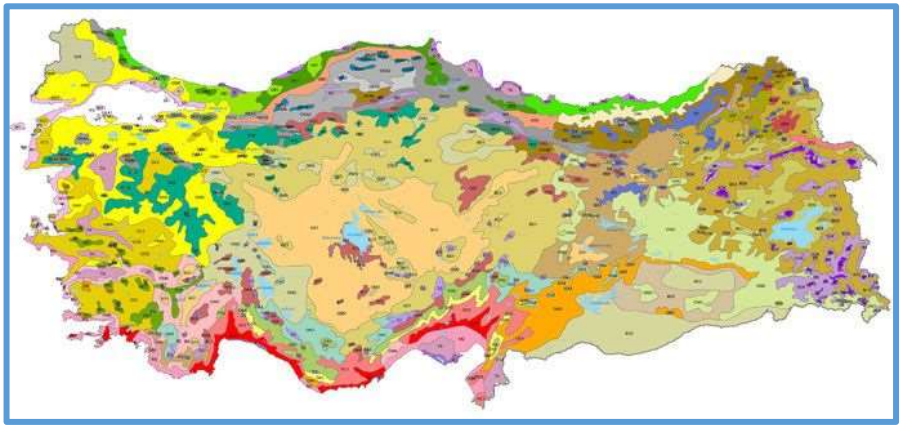
Pland Diversity
-in the World
-in the Caucasia
-in Turkey

WORLD



- 380.360 Plant taxa
- 25.770 Threatened plants

TÜRKİYE



- 13.701 Plant taxa
- 4.319 Endemic plants

	Estimated Number of described species[1]	Number of species evaluated by 2023 (IUCN Red List version 2023-1)	% of described species evaluated by 2023 (IUCN Red List version 2023-1)	Number of threatened species[2] by 2023 (IUCN Red List version 2023-1)	Estimated % threatened species in 2023 (IUCN Red List version 2023-1)[2,3,4]		
					Lower estimate (threatened spp. as % of extant evaluated species)	Best estimate (threatened spp. as % of extant data sufficient evaluated species)	Upper estimate (threatened and DD spp. as % of extant evaluated species)
PLANTS[7]							
Mosses[8]	21,925	327	1.5%	181		*Insufficient coverage*	
Ferns and Allies[9]	11,800	814	7%	316		*Insufficient coverage*	
Gymnosperms	1,113	1,059	95%	450	42%	43%	44%
Flowering Plants	369,000	64,240	17%	25,320		*Insufficient coverage*	

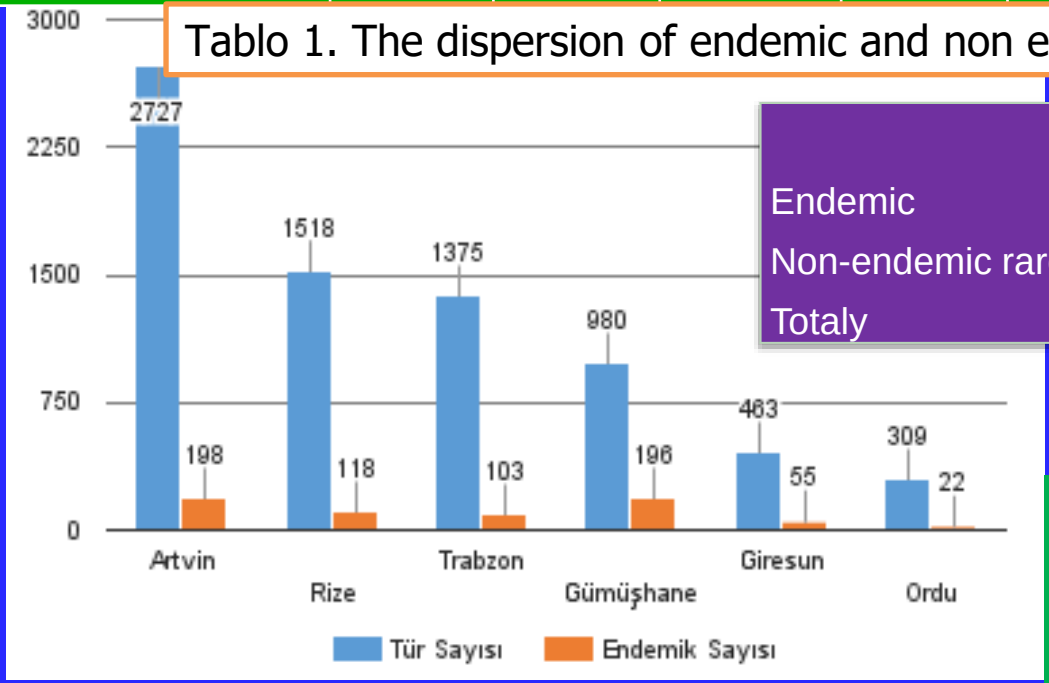
Flora of Artvin

In Artvin, 2727 taxa belonging to 761 genera and 137 families were identified.

	Family	Genus	Species	Subsp.	Var.	Taxa	Endemic
Lycopods	3	5	8	0	0	8	**0**
Pteridophytes	15	25	55	2	0	55	**0**
Gymnosperms	4	6	12	2	3	13	**0**
Angiosperms	115	725	2541	393	141	2651	**198**
Totaly	**137**	**761**	**2616**	**397**	**144**	**2727**	**198**

Tablo 1. The dispersion of endemic and non endemic plant taxa into IUCN risk categories

	CR	EN	VU	LC	NT	DD	NE	Totaly
Endemic	23	32	20	83	16	22	2	198
Non-endemic rare	3	6	76	190	4	23	0	302
Totaly	26	38	96	273	20	45	2	500



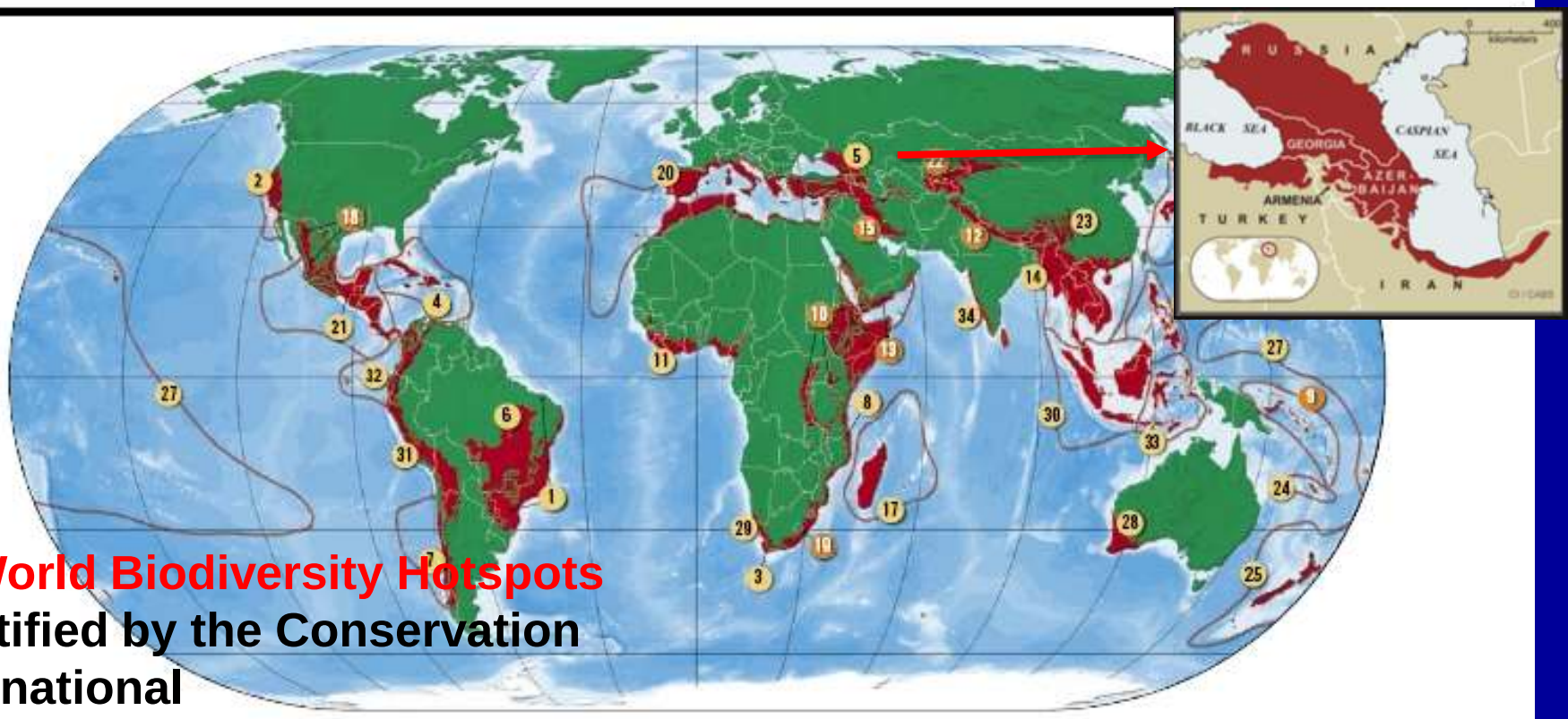
Of 500 rare plants taxa

- 75 taxa are under risk **globaly scale**
- 123 taxa are under risk **Europae scale**
- 302 taxa are under risk **national scale**

INTERNATIONAL IMPORTANCE OF ARTVIN IN TERMS OF PLANT DIVERSITIY

Biodiversity Hotspots

CONSERVATION INTERNATIONAL



36 World Biodiversity Hotspots identified by the Conservation International

Biodiversity Hotspots

Earth's biologically richest places, with high numbers of species found nowhere else. Hotspots face extreme threats and have already lost at least 70 percent of their original vegetation.

1. Atlantic Forest
2. California Floristic Province
3. Cape Floristic Region
4. Caribbean Islands
5. Caucasus
6. Cerrado
7. Chilean Winter Rainfall-Valdivian Forests
8. Coastal Forests of Eastern Africa
9. East Melanesian Islands
10. Eastern Afromontane
11. Guinean Forests of West Africa
12. Himalaya
13. Horn of Africa
14. Indo-Burma
15. Irano-Anatolian
16. Japan
17. Madagascar and Indian Ocean Islands
18. Madrean Pine-Oak Woodlands
19. Maputaland-Pondoland-Albany
20. Mediterranean Basin
21. Mesoamerica
22. Mountains of Central Asia
23. Mountains of Southwest China
24. New Caledonia
25. New Zealand
26. Philippines
27. Polynesia-Micronesia
28. Southwest Australia
29. Succulent Karoo
30. Sundaland
31. Tropical Andes
32. Tumbes-Chocó-Magdalena
33. Wallacea
34. Western Ghats and Sri Lanka

One of the most biologically rich regions on Earth, the Caucasus Biodiversity Hotspot is among the planet's 36 most diverse and endangered hotspots.

Caucasus biodiversity hotspot

One of the most biologically rich regions on Earth, the Caucasus is among the planet's 36 most diverse and endangered hotspots.

Number of endemic plant taxa: **1600**

Area Protected (km2): **42,721**

- The Caucasus hotspot spans 532,658 km² in the nations of
  - Georgia,
  - Armenia,
  - Azerbaijan,
  - the North Caucasian portion of the Russian Federation
    - (including the Dagestan, Chechnya, Ingushetia, Northern Ossetia, Kabardino-Balkaria, Karachai-Cherkesia, and Adigea Autonomous Republics),
  - the northeastern part of Turkey,
  - and a part of northwestern Iran.
- In the southern reaches, this hotspot integrades with the Irano-Anatolian Hotspot.

The Caucasus biodiversity hotspot is home to about 6,400 plant species, more than 1,600 of which (25 percent) are restricted to the region.

Figure 2: CPDs in Turkey

- Artvin and Batumi included in North East Anatolia Plant Diversity Center determined by WWF and IUCN

Artvin and Batumi included in «***Caucasus-Anatolian-Hyrcanian Temperate Forest Ecoregion» which is the one of*** the 200 Global Ecoregions identified by WWF

IMPORTANT AND SENSITIVE AREAS IN ARTVİN

In Artvin, Protected Areas

National Parks 40-3

1.Hatila Valley
2.Karagöl-Sahara
3.Kaçkar Mountain

Nature Parks 203-5

1.Borçka-Karagö
2.Altıparmak
3.Balıklı-Güneşli Waterfalls,
4.Tavşan Hill,
5. Cehennem Canion).

Nature Conservation Areas 31-3

1.Camili-Efeler
2.Camili-Gorgit
3.Çamburnu

Seed Stands (for 36 spcies-341 adet-11 adet)

ne conservation area (for 57 species-276 adet-8)

Biyospher Rezerv 1-1

IPA-144-4

natural monuments 112-2

Kamilet Doğu Kayını
Melodere Doğu Ladini

Many species and habitats in Artvin are subject to the Bern Convention and CITES

- The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) was adopted in Bern, Switzerland in 1979,
- Turkey signed it in 1984
- Turkey : 87 taxa
- Artvin : 6 taxa
- **Species:**
- *Cyclamen coum, Dracocephalum austriacum, Lindernia procumbens, Marsilea quadrifolia, Orchis punctulata* and *Vaccinium arctostaphyllos.*

- **Habitats:**
- *Black Sea Oriental Beech-Oriental Spruce Forests,*
- Anatolian-Caucasus Oriental Hornbeam Forests,
- Black Sea Mixed Oak-Hornbeam forests,
- Black Sea Birch Forests,
- Oriental Spruce Forests, and
- Black Sea-Caucasus Mountainous Alder Gallery Forests

- The Convention on Trade in Endangered Species of Wild Flora and Fauna (CITES or the Washington Convention) was adopted in Washington DC, in March 1973
- Turkey signed it in 1994
- Turkey : 114 taxa
- Artvin : 17 taxa

- ***Species:***
- *Galanthus krasnovii, G. rizehensis, G. woronowii,*
- *Anacamptis pyramidalis, Cephalanthera damasonium, C. rubra, Dactylorhiza osmanica* var. *osmanica, D. romana,*
- *Orchis coriophora, O. coriophora* subsp. *fragrans, O. italica, O. punctulata O. purpurea,*
- *Cyclamen coum* subsp *caucasicum, C. coum* subsp. *coum, C. parviflorum var. parviflorum* ve *C. parviflorum var. subalpinum*

Dactylorhiza osmanica
(Orchid)
Endemic-VU

Orchis_purpurea
(Orchid)

Orchis coriophora
(Orchid)

Orchis punctulata
(Orchid)

Anacamptis pyramidalis
(Orchid)

Cephalenthera rubra
(Red orchid)

Cephalanthera damasonium

Lindernia procumbens
(False pimpernel)

Marsilea quadrifolia
(Water clover)

Galanthus khrasnovi- VU
(Snowdrop)

Galanthus woronowii

Vaccinium arctostaphylos
(Whortleberry)

Cyclamen coum
(Sowbread)

Colchic Relict Plant Species

Rhodothamnus sessilifolius
(Dwarf alpenrose)-very localy-Endemic-CR

Epigaea gaultherioides
(Mayflower)-Relict-VU

- **Due to the fact that the Caucasus was spared from the severe effects of glacial retreats during the last Ice Age, the region is also unique with respect to the many relict plant species;**

Betula medwediewii
Transcaucasian Birch
Relict-VU

Osmanthus decorus
Relict-VU

Quercus pontica
(Oak)
Relict-VU

•Artvin and the Coruh Valley are very important relictual refuge regions for many plant species that are remnants of an ancient Mediterranean enclavs.

Stone pine (*Pinus pinea) community – Gene protection forest*

Cistus creticus

Cistus salviifolius

Olea europaea var. *sylvestris*

Periploca gracea

Trachomitum venetum

Jasminum fruticans

Cotinus coggyria

Arbutus andrachne

Rhus coriaria

Major threats to the Plant Diversity in the Region

- Building Large Dams on the main channel of the Coruh River
- Constructing so many run-of-river type small hydropower plants
- Building new roads for transportation
- Mining activities within forested areas
- Over-collection of flowers, bulbs and vegetative parts of rare and endemic plants
- Urbanization
- Expantion of structuring into the natural areas
- Unproper logging in forest ecosystems
- Overgrazing

Mining activities create forest clearing, soil and water pollution within forested areas in Murgul, Artvin

Rhododendron smirnovii-VU

Mining activities causes forest degradation and acid rains on the vegetation growing in Murgul, Artvin

Rhododendron ungernii-VU

Drosera rotundifolia-VU

DAMS in ARTVİN

Coruh valley is rich in plants and contains about 1000 plants (104 nationally threatened plant species of which 67 are endemic to Turkey).

Rare plants that will spread in the Coruh valley moved to the Botanical Garden for ex-situ conservation

Botanical Garden Establishment in Artvin

Landscape Application Project with the Support of ANG Foundation
(ANG Vakfı Desteği ile Peyzaj Uygulama Projesi)

Since the garden has a sloping terrain, terracing was used. The planning of the botanical garden was organized on these pre-existing terraces. There are 16 terraces at different levels and of different sizes, 9 of which are open to visitors and 7 of which are closed to visitors. For these terraces, the term "Palya" was used within the scope of the garden.

automatic irrigation system
Sulama Otomasyonu

plant tunnels/Bitki Tünelleri

D&R and Exhibition Greenhouse
AR-GE ve SERGİ SERASI

Local Houses Street and Ethnographic Garden
Yöresel Evler Sokağı ve Etnoğrafik Bahçe

Kafe/Cafe








Organic pond/ Organik Gölet

General view

Contrubution to the our seed collection from European Botanical Garden especially Batumi

Spain

Czech Republic

We applied to IPEN

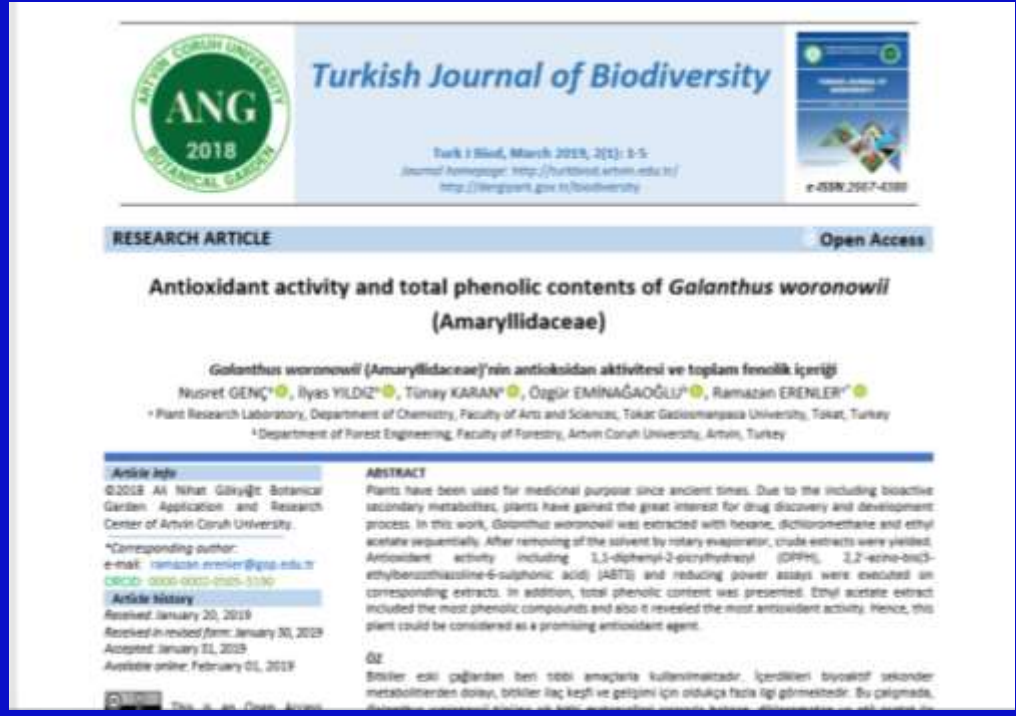
USA

Georgia

Hungary

Latvia

WEB PAGE: http://turkbiod.artvin.edu.tr/



E-PRESSED ARTICLE SAMPLE

The **Turkish Journal of Biodiversity** (Turk J Biod), founded in 2018, is a double blind peer-reviewed international journal.

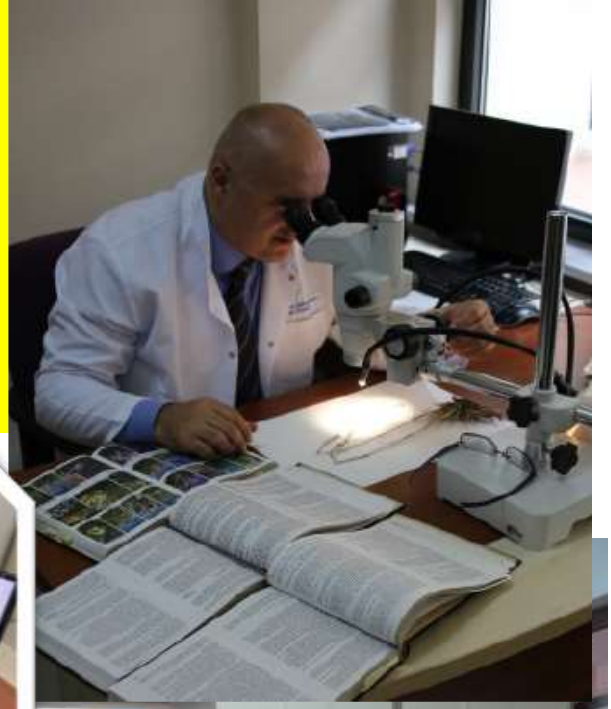
It is published electronically by the Ali Nihat Gökyiğit Botanical Garden Application and Research Center of Artvin Çoruh University in collaboration with ULAKBIM.

It publishes full-length original research papers for a broad range of international scientists.

- Published 2 times a year (to be issued in *March* and *September*)
- Free submission and publication
- Free access

ARTVİN ÇORUH UNIVERSITY HERBARIA
were established in 1994.

Its International Herbarium Index Code is ARTH
It includes more than 40.000 plant samples
OTOBUR data recording and management system is used in the Herbarium and Botanical Garden.

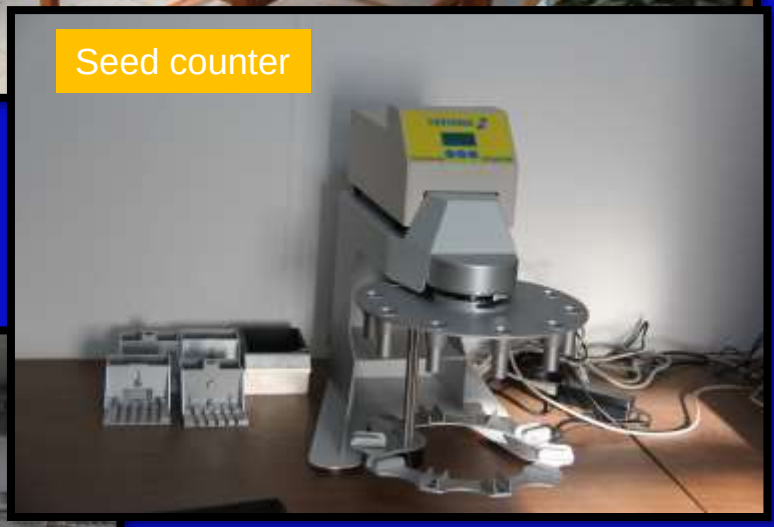






Seed House
KLİMATİZE TEST ODASI


Plant drying room


Seed counter


Inside of seed house

SOME RARE AND ENDEMIC SPECIES OF ARTVIN

Mountain Rose

Rhodothamnus sessilifolius

Endemic-CR

Mountain Apple
Epigaea gaultherioides
Relict-VU

Betula medwediewii
Relict-VU

Quercus pontica
Relict-VU

Osmanthus decorus
Relict-VU

Chesneya elegans
Endemic

Cyclamen coum
(Sowbread)

Alyssum artvinense
(Madwort)
Endemic

Campanula choruhensis
Çoruh bellflower

Campanula betulifolia-
Leafy of birch bellflower
Endemic - VU

Campanula trogera-
Artvin bellflower
Endemic - *VU*

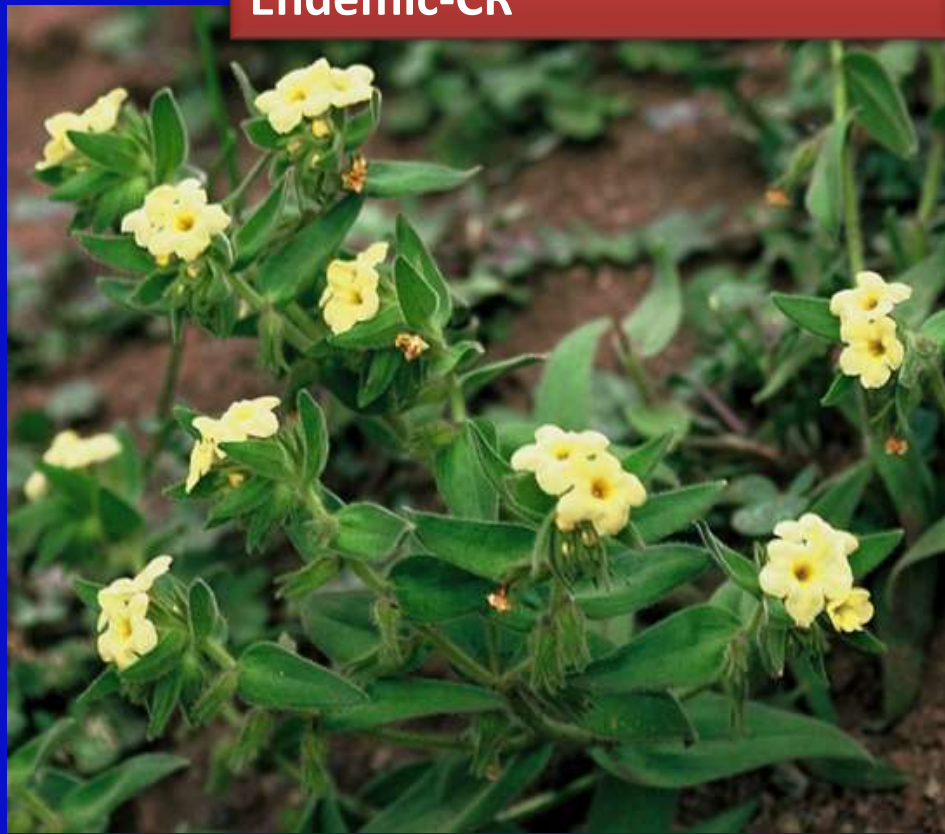
Linaria genistifolia ssp. *artvinense*
(Toadflax)
Endemic-CR

Morina persica

Lathyrus woronowii
(Pea)
Endemic-CR

Acer cappadocicum subsp. divergens
(Maple)
Endemic, VU

Alkanna cordifolia
(Alkanet)
Endemic-CR



Veronica liwanensis
(Speedwell)
Rare

Tulipa julia
(Tulip)

Tulipa armena

Centaurea woronowii
(Knapweed)
Endemic

Glaucium leiocarpum
(Hornpoppy)

Psephellus pecho
Endemic

Hesperis isaditea
Endemic-VU

Saponaria prostrata
(Soapwort)

Lilium kesselringianum-VU
(Lily)

Lilium ponticum - VU

Lilium monodelphum ssp. *szowitsianum*
Endemic-VU

Pulsatilla albana
Pasque flowers

Pulsatilla violaceus

Fritillaria michailovskyi
Endemic-CR

Fritillaria latifolia

Fritillaria caucasica

Iris caucasica;
Caucasian iris

Iris nezahatiae
Endemic

POSSIBILITIES OF BILATERAL RELATIONS

First of all,

- ***Staff exchanges program can be done.***
- We can act together **to protect** rare species at risk that naturally spread in the region.
- We can **prepare projects** for international funds to protect biodiversity and contribute to regional development.
- ***Transboundary protected areas should be developed.***

✓ *Botanical tourism should be developed*

Thanks for listening patiently…

Sabırla dinlediğiniz için teşekkürler…