

SUBALPINE VEGETATION IN GIRESUN MOUNTAINS

On-line Suppl. Tab. 1. Plant associations and subassociations in the study area. In the bottom of the table, the rare species are reported with 1, + or r in less than three plots.

Life Form	Coordinates	Date	Size of plot (m ²)	Plot No	Subassociations	Bunio microcarpaee-Festucetum pinifoli		Lotus corniculati-Festucetum turcici		Alyso pseudo-mouradici-Juniperetum saxatilis	
						verbasetosum pinifolii	verbasetosum pinifolii	verbasetosum pinifolii	verbasetosum pinifolii	verbasetosum pinifolii	verbasetosum pinifolii
H	<i>Festuca pinifolia</i> var. <i>pinifolia</i>										
G	<i>Bunium microcarpum</i> subsp. <i>bourgaei</i>										
H	<i>Veronica peduncularis</i>										
H	<i>Lotus corniculatus</i> var. <i>alpinus</i>										
H	<i>Oxytropis lazica</i>										
H	<i>Poa alpina</i> subsp. <i>fallax</i>										
H	<i>Leontodon hispidus</i> var. <i>hispidus</i>										
H	<i>Minuartia hirsuta</i>										
H	<i>Crocus kotschyanus</i> subsp. <i>saworowianus</i>										
H	<i>Koeleria eriostachya</i>										
H	<i>Verbascum freedrii</i>										
H	<i>Pterohagia alpina</i>										
H	<i>Linaria genisifolia</i> subsp. <i>linifolia</i>										
H	<i>Hypericum scabrum</i>										
H	<i>Verbascum armenum</i> var. <i>tempyanum</i>										
H	<i>Minuartia umbellifera</i> subsp. <i>umbellifera</i> var. <i>umbellifera</i>										
H	<i>Festuca amethystina</i> subsp. <i>orientalis</i> var. <i>turcica</i>										
H	<i>Lotus corniculatus</i> var. <i>corniculatus</i>										
H	<i>Scorzonera cana</i> var. <i>radicosa</i>										
Ch	<i>Juniperus communis</i> subsp. <i>saxatilis</i>										
H	<i>Alyssum pseudo-mouradicum</i>										
H	<i>Dianthus zedbaueri</i>										
H	<i>Myosotis propinqua</i>										
G	<i>Muscari armeniaca</i>										
H	<i>Trisetum flavescens</i>										
H	<i>Scempervivum minus</i> var. <i>minus</i>										

Class	Order	Alliance	Associations	Subassociations	Plot No	Size of plot (m ²)	Date	Bunio microcarpae-Festucetum pinifoli		verbaacetosum froedini		Lotus corniculati-Festucetum turcici		Alyso pseudo-mouradici-Juniperetum saxatilis	
								10	9	8	7	6	5	4	3
H	<i>Ilisiona supina</i> subsp. <i>ponitica</i>														
	Phlomidia armeniacae-														
	<i>Astragalus microcephali</i>														
	Akman, Ketenoğlu, Quézél														
	and Demirörs 1984														
	<i>Teucrium chamaedrys</i> subsp.														
	<i>chamaedrys</i>														
	<i>Silene olympicae-Astragalion</i>														
	<i>densifoli</i> Akman, Quézél,														
	Yurdakulol, Ketenoğlu,														
	Demirörs 1987														
	<i>Erysimum pulchellum</i> subsp.														
	<i>pulchellum</i>														
	<i>Hyperico linarioidis-</i>														
	<i>Thymetalia scorpii</i> Akman,														
	Quézél, Yurdakulol,														
	Ketenoğlu, Demirörs 1987														
	<i>Thymus praecox</i> subsp.														
	<i>caucasicus</i>														
	<i>Hypericum linarioides</i> subsp.														
	<i>linarioides</i>														
	<i>Cota melanoloma</i> subsp.														
	<i>melanoloma</i>														
	<i>Stachys bithynica</i>														
	<i>Astragalus microcephali-</i>														
	<i>Brometetea tomentalli</i> Quézél														
	1973 em. Parolly														
	<i>Ajuga orientalis</i>														
	<i>Cruciata taurica</i>														
	<i>Diacylis glomerata</i> subsp.														
	<i>hispanica</i>														
	<i>Silene spargulifolia</i>														
	Others														
	<i>Thymus spyleus</i> subsp. <i>rosulans</i>														
	<i>Rumex acetosella</i>														
	<i>Helictotrichon pubescens</i> subsp.														
	<i>pubescens</i>														

Class	Order	Alliance	Associations	Bunio microcarpae-Festucetum pinifoli		verbasetosum froedonii		Lotus corniculati-Festucetum turcici		Alyso pseudo-mouradici-Juniperetum saxatilis		Date	Size of plot (m ²)	Plot No	Subassociations	Aspect	Slope (%)	Height of shrub layer (cm)	Coverage of shrub layer (%)	Height of herb layer (cm)	Coverage of herb layer (%)	Altitude (m)	Total species richness (vascular plants)							
				SW	SE	SW	SE	SW	SE	SW	SE													SW	SE					
H	Mnuartia juniperina											16/07/2016	10	N40°27'20" E38°23'17"		SW	25	30	20	20	20	20	20	20	20	20	20	N40°27'20" E38°23'17"	phi	
H	Hypericum orientale											16/07/2016	9	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Medicago papulosa											16/07/2016	8	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Alchemilla erythropoda											16/07/2016	7	N40°27'21" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'21" E38°23'17"	
H	Hypericum elongatum subsp.											16/07/2016	6	N40°27'21" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'21" E38°23'17"	
H	diagnostum											16/07/2016	5	N40°27'21" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'21" E38°23'17"	
H	Ornithogalum oligophyllum											16/07/2016	4	N40°27'21" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'21" E38°23'17"	
G	Ornithogalum meifolium											16/07/2016	3	N40°27'21" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'21" E38°23'17"	
H	Polygonum bistorta subsp.											16/07/2016	2	N40°27'21" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'21" E38°23'17"	
H	bistorta											16/07/2016	1	N40°27'21" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'21" E38°23'17"	
H	Trifolium ochroleucum											16/07/2016	10	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
G	Crocus speciosus subsp.											16/07/2016	9	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
G	speciosus											16/07/2016	8	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Poa bulbosa											16/07/2016	7	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Cytisus pygmaeus											16/07/2016	6	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Logfia arvensis											16/07/2016	5	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Polygala pruinosa subsp.											16/07/2016	4	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	pruinosa											16/07/2016	3	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Poa pratensis											16/07/2016	2	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Helictenium nummularium											16/07/2016	1	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	subsp. tonentosum											16/07/2016	10	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Ranunculus polyanthemos											16/07/2016	9	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Myosotis olympica											16/07/2016	8	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Asperula nitida subsp.											16/07/2016	7	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	subcapitata											16/07/2016	6	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Helictisium graveolens											16/07/2016	5	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Helictisium arenarium subsp.											16/07/2016	4	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	aucherii											16/07/2016	3	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Gadium humifusum											16/07/2016	2	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Ranunculus sericeus											16/07/2016	1	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
T	Alyssum minutum											16/07/2016	10	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Bifonia tenuifolia											16/07/2016	9	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Calamagrostis arundinacea											16/07/2016	8	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Carex oreophila											16/07/2016	7	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Scorzonera cana var. jacquiniana											16/07/2016	6	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	
H	Gadium incanum subsp. elatius											16/07/2016	5	N40°27'20" E38°23'17"		SW	0	0	0	0	0	0	0	0	0	0	0	0	N40°27'20" E38°23'17"	

Life Form

Class	*** <i>Caricetia curvulae</i> Br.-Bl. 1948		** <i>Caricetalia curvulae</i> Br.-Bl. in Br.-Bl. et Jemny 1926		* <i>Agrostia lazicae-Sibbaldion parviflorae</i> Vural 1996		Astragal microcephali-Brometea tomentelli Quézel 1973 em Parolly		Hyperico linarioidis-Thymetalia scorpiifolii Akman, Quézel, Yurdakulol, Ketenoglu, Demiriors 1987		Pediculario comosa-Asterion alpini Akman, Quézel, Yurdakulol, Ketenoglu, Demiriors 1987		Alyso pseudo-mouradici-Juniperetum saxatilis	
Order	Bunio microcarpae-Festucetum piniifoli		Bunio microcarpae-Festucetum piniifoli		Bunio microcarpae-Festucetum piniifoli		Bunio microcarpae-Festucetum piniifoli		Bunio microcarpae-Festucetum piniifoli		Bunio microcarpae-Festucetum piniifoli		Bunio microcarpae-Festucetum piniifoli	
Alliance	oxytropetosum lazicae		oxytropetosum lazicae		oxytropetosum lazicae		oxytropetosum lazicae		oxytropetosum lazicae		oxytropetosum lazicae		oxytropetosum lazicae	
Subassociations	verbascetosum froedii		verbascetosum froedii		verbascetosum froedii		verbascetosum froedii		verbascetosum froedii		verbascetosum froedii		verbascetosum froedii	
Plot No	10		10		10		10		10		10		10	
Size of plot (m ²)	20		20		20		20		20		20		20	
Date	16/07/2016		16/07/2016		16/07/2016		16/07/2016		16/07/2016		16/07/2016		16/07/2016	
Coordinates	N40°27'20" E38°23'17"		N40°27'20" E38°23'17"		N40°27'20" E38°23'17"		N40°27'20" E38°23'17"		N40°27'20" E38°23'17"		N40°27'20" E38°23'17"		N40°27'20" E38°23'17"	
Aspect	SW		SW		SW		SW		SW		SW		SW	
Slope (%)	25		25		25		25		25		25		25	
Height of shrub layer (cm)	0		0		0		0		0		0		0	
Coverage of shrub layer (%)	0		0		0		0		0		0		0	
Height of herb layer (cm)	40		40		40		40		40		40		40	
Coverage of herb layer (%)	85		85		85		85		85		85		85	
Altitude (m)	2200		2200		2200		2200		2200		2200		2200	
Total species richness (vascular plants)	26		26		26		26		26		26		26	
H <i>Timonium armenium</i>														
H <i>Thlaspi ochroleucum</i>														
H <i>Sisymbrium elatum</i>														
H <i>Bromus danthoniae</i>														
H <i>Pedicularis caucasic</i>														
H <i>Onobrychis montana</i> subsp. <i>caduca</i>														
H <i>Crabro orientalis</i> var. <i>orientalis</i>														
H <i>Lanium galactophyllum</i>														
H <i>Myosotis lithospermifolia</i>														
H <i>Nepeta nuda</i> subsp. <i>nuda</i>														
H <i>Potentilla cappadocica</i>														
G <i>Gagea glacialis</i>														
H <i>Senecio viscosus</i>														
H <i>Asperula laxiflora</i>														
G <i>Avenone narcissiflora</i> subsp. <i>wildenowii</i>														
H <i>Cirsium edchinus</i>														
Ch <i>Astragalus barbo-jovis</i> var. <i>barbo-jovis</i>														
H <i>Digitalis lamarkii</i>														
H <i>Marrubium astracanicum</i> subsp. <i>astracanicum</i>														
H <i>Stellaria holostea</i>														
H <i>Myosotis alpestris</i>														
H <i>Helictrysum armenicum</i> subsp. <i>armenicum</i>														
H <i>Senecio pseudo-orientalis</i>														

Less common species:
Geranium ibericum subsp. *jibatum* [H], 31: +; *Alyssum amplexicaule* subsp. *amplexicaule* [H], 31: +; *Lapsana communis* var. *alpestris* [H], 42: +; *Aethionema ibericum* [H], 17: +; *47: +; Trifolium hybridum* var. *anatolicum* [H], 33: 1; *Gallium verum* subsp. *verum* [H], 53: 1; *57: 1; Leonodon crispus* var. *asper* [H], 14: +; *15: +; Hieracium giresunense* [H], 16: +; *13: +; Minuartia hybrida* subsp. *turcica* [H], 51: 1; *53: 1; Nepeta italica* [H], 6: +; *7: +; Lamium macroron* [H], 19: +; *20: +; Carduus lanuginosus* [H], 22: +; *24: +; Centaurea reuterana* subsp. *reuterana* [H], 14: +; *15: +; Allium aucheri* [G], 14: +; *16: 1; Euphorbia rigida* [H], 14: +; *15: +; Polygonum alpinum* [H], 12: +; *13: +; Minuartia hybrida* subsp. *turcica* [H], 51: 1; *53: 1; Nepeta italica* [H], 57: +; *58: +; Sedum pallidum* var. *bilynicum* [H], 15: 1; *Acanthilimon bracteatum* var. *bracteatum* [Ch], 18: 1; *Cirsium rhizocephalum* subsp. *sinuatum* [H], 7: +; *Alyssum armenium* [H], 18: +; *Crucianella glanica* subsp. *pontica* [H], 6: +; *Asperula suavis* [H], 16: +; *Astragalus abyssoides* [H], 14: 1; *Bromus lanceolatus* [H], 14: 1; *Euphorbia pectinata* [H], 42: +; *Gymnadenia conopsea* [G], 32: r; *Poa chaixii* [H], 15: 1; *Stipa ehrenbergiana* [H], 20: +; *Arabis alpina* subsp. *alpina* [H], 52: +; *Euphorbia herniariaefolia* var. *glaberrima* [H], 53: 1; *Thlaspi huetii* [T], 51: 1; *Festuca oreophila* [H], 52: 1; *Rosa canina* [Ch], 53: +; *Cyclamen parviflorum* subsp. *parviflorum* [G], 32: r

On-line Suppl. Tab. 2. Intraset correlation coefficient and eigenvalues of the first two axes for canonical correspondence analysis and environmental variables. Bold refers to the highly significant ones.

	Axis 1	Axis 2
Aspect	-0.30	0.64
Slope	-0.50	-0.61
Altitude	0.05	0.80
Soil moisture ratio (SM)	-0.97	0.14
pH	-0.43	0.01
Soil clay content (Clay)	-0.94	0.13
Total soil nitrogen ratio (N)	-0.98	0.14
Canonical eigenvalue	0.70	0.51
% variance explained	13.75	10.12
Cumulative % variance	13.75	23.87
Kendal rank correlation of species/environment scores	0.72	0.66