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SYNTAXONOMICAL CONTRIBUTION TO THE VEGETATION CLASSIFICATION OF TÜRKIYE FROM SW ANATOLIA: A PLANT DIVERSITY HOTSPOT

SINTAKSONOMSKI PRILOG KLASIFIKACIJI VEGETACIJE TURSKE IZ JZ ANATOLIJE: ŽARIŠTE RAZNOLIKOSTI BILJAKA

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SUMMARY

This study was carried out to determine the vegetation diversity and gradient of the Bencik Mountain in SW Anatolia, Türkiye, which is a plant biodiversity hotspot. The field sampling was realized in accordance with the Braun-Blanquet's methodology. For the classification of communities, hierarchical cluster analysis was used. Ecological interpretation of the defined communities was done by nonmetric multi-dimensional scaling with passive projection of topographical variables. Five plant communities belonging to different vegetation types (forest, macchia and regressive successional stage) were identified. Except for regressive successional stage, the others were described at the association level. Three of them were newly described. The pine-dominated forests are represented by *Hymenocarpo circinnati-Pinetum brutiae* under the alliance *Styraco officinalis-Pinion brutiae* (*Pinetalia halepensis*, *Pinatea halepensis*) and *Vicio lathyroidis-Pinetum pallasianae* under the alliance *Adenocarpo-Pinion pallasianae* (*Erico-Pinetalia*, *Erico-Pinetea*). Both of them are new associations. The riparian sites are represented by *Nerio oleandri-Platanetum orientalis* under the alliance *Platanion orientalis* (*Populetalia albae, Alno glutinosae-Populetea albae*). The macchia is represented by *Daphno gnidiois-Quercetum cocciferae*, a new association belonging to the alliance *Quercion cocciferae* (*Quercetalia cocciferae*, *Quercetea ilicis*). The regressive successional stage is represented by the *Aegilops triuncialis-Clypeola jonthlaspi* community, which resulted from the overgrazing and intensive human use of *Quercus coccifera* macchia. Floristic differentiation of the study area vegetation is significantly correlated with topographical variables (elevation and aspect). This study not only indicated the diverse vegetation richness of the area and its nature conservation value but also made an important contribution to the understanding of Mediterranean vegetation in Türkiye.

KEY WORDS: Bencik Mountain, classification, Mediterranean, ordination, Türkiye, vegetation

INTRODUCTION
UVOD

Plant communities are formed by the plants distributing in similar environmental conditions and form the general vegetation structure in a region. Defining plant communities is crucial in determining plant biodiversity, understanding ecological differentiation, and assessing habitat diversity (Blasi and Burrascano 2013). Such knowledge is very important for the management of natural resources and especially for nature conservation studies.

In order to carry out large-scale studies on vegetation analysis, it is necessary to determine the plant communities at the local scale. In this context, it is seen that studies on plant communities are intensive around the world and have been conducted to a large extent, especially in Europe (Chytrý et al. 2016). As a matter of fact, comprehensive ve-

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getation databases for European vegetation, based on the studies carried out on a local scale, have been constituted, and comprehensive classifications have been carried out. Based on these databases, European habitat classification has almost been completed, and the distribution of plant communities at the alliance level has been mapped (Chytrý et al. 2020; Preislerová et al. 2022).

The number of plant sociology studies in Türkiye intensified in the 1970s, especially with the contributions of foreign researchers. In the following years, these numbers increased with the participation of Turkish researchers who were interested in the subject, and a substantial contribution was made to the vegetation sciences in Türkiye (Quézel et al. 1992; Ketenoğlu et al. 2010; Bergmeier et al. 2018). Based on these studies, some large-scale datasets were prepared and analyzed, such as the Forest Vegetation Database of Turkey (Kavgacı et al. 2021), oak forest vegetation in Turkey (Uğurlu et al. 2012), and western Euxine forest vegetation of Turkey (Çoban and Willner 2019). With the vegetation studies based on these datasets, significant contributions to the understanding of the vegetation and habitat diversity of the country were made. However, enriching these datasets with data from previously unstudied regions is important to better understand the diversity at the country level and to contribute to the European vegetation classification system (Mucina et al. 2016).

In addition to the studies carried out in different parts of Türkiye, SW Türkiye was also subjected to several phytosociological studies, such as by Vural et al. (1995), Özel (1996), and Kavgacı et al. (2017, 2021). However, the Bencik Mountain located in the Muğla province (SW Türkiye), one of the high plant biodiversity regions in Türkiye, was not studied, and to understand the diversity and richness at a regional scale, the determination of the vegetation diversity of this mountain is crucial. Therefore, in this study, it was aimed to determine the plant communities of the Bencik Mountain vegetation, reveal their relationship with topographical variables, and evaluate them in terms of plant biodiversity parameters. The south and southwest of Türkiye are plant biodiversity hotspots, and the study area is located in this region. It is thought that the study carried out at this location would make a significant contribution to the vegetation science.

MATERIAL AND METHODS
MATERIJAL I METODE

Study area – *Istraživano područje*

The study area, which is located in southwestern Türkiye, is within the borders of the Yatağan district of the Muğla province (Figure 1). The region is situated within the Mediterranean phytogeographical boundaries. The elevation of the Bencik Mountain area varies between 400 m and 1396 m.

The bedrock of the study area consists of marble, phyllite, and schists from the upper Paleozoic and Mesozoic periods (Kayan 1979). There are colluvial, limeless brown, brown, and red-brown Mediterranean soils that exist in the study area (Anonymous 1998).

A less rainy and warm Mediterranean climate is seen in the region. The average temperature is 16.2°C, the average precipitation is 631.74 mm, the coldest and warmest months are February and July, respectively (Meteorology General Directorate 2018).

Field sampling and data assessment – *Terensko uzorkovanje i analiza podataka*

The field sampling was carried out on the Bencik Mountain (Yatağan/Muğla-Türkiye) between 2016 and 2019. For the definition of the plant associations, sampling plots were taken from each plant formation in an adequate number and

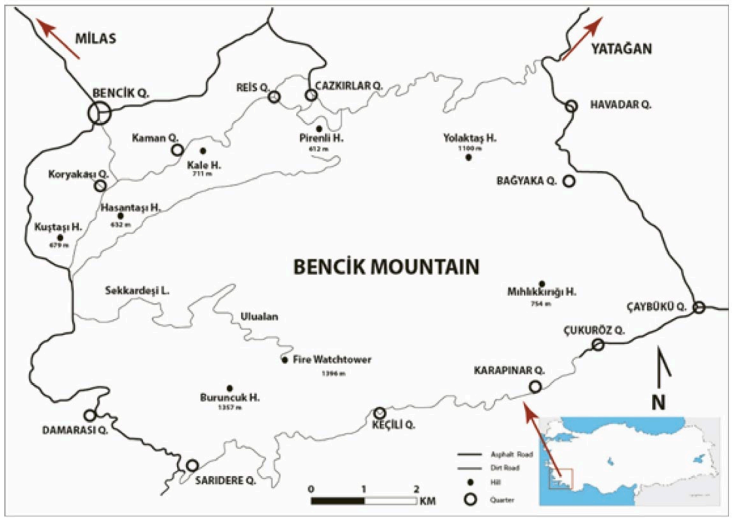


Figure 1. Geographic map of the research area (Abbreviations: Q: Quarter, H: Hill, L: Location).
Slika 1. Karta istraživanog područja (Kratice: Q: predio, H: vrh, L: lokalitet)

suitable size. In addition to the forest and shrubland vegetation in the study area, the regressive successional stage, especially in contact with Quercus coccifera machia, and sclerophyllous forests were also sampled to understand the effects of degradation. The protocol of each plot includes general topographic and other data of individual plots, such as elevation, inclination, aspect, vegetation cover (total and individual layers), and a list of all vascular plants, in which a cover value was assigned to each species according to the cover – abundance scale of Braun-Blanquet (1932).

For the classification analyses, the Sorensen (Bray-Curtis) coefficient as a resemblance measure and Ward's method as a group linkage method were applied in the PC-ORD program (Versions 4 and 5). The diagnostic species of the accepted clusters were identified by a fidelity measure in the JUICE (version 7.1) program (Tichý 2002). The threshold of the phi value was subjectively selected at 0.50 for a species to be considered diagnostic (Chytrý et al. 2002). Species whose occurrence concentration in the plots of a particular cluster was not significant at $p<0.05$ (Fisher´s exact test) were excluded from the set of diagnostic species (Tichý and Chytrý 2006). Species with 50% frequency in each plant community were accepted as constant species, and species with a cover of more than 25% in at least 10% of the vegetation plots in each community were considered as dominant species.

The results of the classification were visualized by ordination techniques in non-metric multidimensional scaling (NMDS). Topographical variables (elevation, aspect, and inclination) were passively shown on the ordination plane. Moreover, the topographical variables were visualized by a box-wishers diagram prepared in JUICE. The nomenclature of plant species follows the Flora of Turkey (Davis 1965–1985; Davis et al. 1988) and the Plant List of Turkey (Güner (ed.) 2012). The IUCN categories of the endemic taxa collected from the study area were determined from the Red Book of Turkish Plants (Ekim et al., 2000; IUCN, 2003). New syntaxa were described in accordance with the International Code of Phytosociological Nomenclature (ICPN; Theurillat et al. 2021).

RESULTS
REZULTATI

Classification – *Klasifikacija*

The classification analyses showed that the Bencik Mountain vegetation is formed by five different plant communities representing different vegetation types: forests, macchia and regressive successional stage (Figure 2).

The vegetation table of the communities is submitted in Table 1 (see in Apendix).

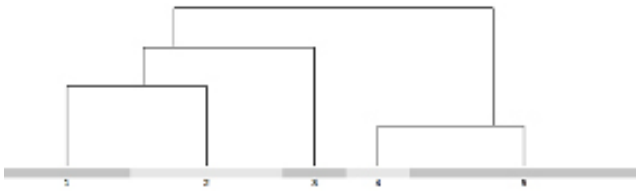


Figure 2. Dendrogram of the Bencik Mountain vegetation by the hierarchical cluster analysis (1. *Hymenocarpos circinnatus-Pinus brutia* forest, 2. *Daphne gnidioides-Quercus coccifera* macchia, 3. *Nerium oleander-Platanus orientalis* forest, 4. *Vicia lathyroides-Pinus nigra* subsp. *pallasiana* forest, 5. *Aegilops triuncialis-Clypeola jonthlaspi* regressive successional stage).

Slika 2. Dendrogram vegetacije na planini Bencik dobiven hijerarhijskom klasterskom analizom (1. šuma *Hymenocarpos circinnatus-Pinus brutia*, 2. makija *Daphne gnidioides-Quercus coccifera*, 3. šuma *Nerium oleander-Platanus orientalis*, 4. šuma *Vicia lathyroides-Pinus nigra* subsp. *pallasiana*, 5. garig *Aegilops triuncialis-Clypeola jonthlaspi*).

Hymenocarpos circinnatus-Pinus brutia forest

This forest represents the Turkish red pine dominated forests in the area. It is mainly found between 647 m and 1094 m. Above this belt, it represents a non-homogeneous structure and mixes with *Pinus nigra* subsp. *pallasiana* at ecotones up to an elevation about 1200 m. It appears to have almost all kinds of aspects with the inclination between 10° and 45°. Soil types are limeless brown and brown forest soil consisting of marble and schist rocks. The general coverage of the community is between 75% and 95%. The community consists of three vertical layers. The tree layer cover is 70–90% with 20–30 m height; the shrub layer is 15–60% with 0.1-4 m height; and the herb cover is 30–95% with 0.6–1.1 m height.

Diagnostic species: *Asplenium ceterach*, *Briza maxima*, *Centaurea cariensis* subsp. *maculiceps*, *Cistus creticus*, *Crepis vesicaria*, *Crucianella latifolia*, *Dactylis glomerata* subsp. *hispanica*, *Galium heldreichii*, *Hymenocarpos circinnatus*, *Lathyrus aphaca* var. *affinis, Pilosella piloselloides* subsp. *piloselloides*, *Pinus brutia* var. *brutia*, *Quercus ithaburensis* subsp. *macrolepis*, *Sanguisorba minor* subsp. *minor*, *Scandix australis* subsp. *grandiflora*, *Scorzonera elata*, *Spiranthes spiralis*, *Trifolium uniflorum*

Constant species: *Asplenium ceterach*, *Briza maxima*, *Bromus sterilis*, *Carex flacca* subsp. *erythrostachys*, *Cistus creticus*, *Crepis vesicaria*, *Crucianella latifolia*, *Cynosurus echinatus, Dactylis glomerata* subsp. *hispanica*, *Doronicum orientale*, *Euphorbia rigida*, *Galium heldreichii*, *Hymenocarpos circinnatus*, *Lathyrus aphaca* var. *affinis, Milium pedicellare*, *Oryzopsis coerulescens*, *Pilosella piloselloides* subsp. *piloselloides, Pinus brutia*, *Poa bulbosa*, *Quercus coccifera*, *Quercus ithaburensis* subsp. *macrolepis*, *Sanguisorba minor* subsp. *minor*, *Scandix australis* subsp. *grandiflora*, *Scorzonera elata*, *Torilis arvensis* subsp. *neglecta*, *Trifolium campestre*, *Trifolium grandiflorum*, *Trifolium stellatum* var. *stellatum*, *Trifolium uniflorum*.

Dominant species: *Pinus brutia*

Daphne gnidioides-Quercus coccifera macchia

Daphne gnidioides-Quercus coccifera macchia is found between the elevations of 663 and 748 m. It generally appears in the northern, northeastern, eastern, and southern aspects. The inclination changes between 5° and 30°. It is located on brown forest soil, which consists of phyllite rocks. The general cover of the vegetation type is between 70% and 90%. The vegetation type consists of two vegetation layers. The shrub layer cover is 70-90% with the height of 0.5-6 m, and the herb cover is 10-60% with the height of 0.7-1.5 m.

Diagnostic species: *Aegilops umbellulata*, *Caucalis platycarpos*, *Daphne gnidioides*, *Euphorbia rigida*, *Lagoecia cuminoides*, *Legousia speculum-veneris*, *Minuartia anatolica* var. *anatolica*, *Securigera cretica*, *Sherardia arvensis*, *Styrax officinalis*, *Trifolium lucanicum*

Constant species: *Aegilops umbellulata*, *Alyssum smyrnaeum*, *Asparagus acutifolius*, *Avena barbata* subsp. *barbata*, *Bromus sterilis*, *Carex flacca* subsp. *erythrostachys*, *Caucalis platycarpos*, *Cistus creticus*, *Crucianella latifolia*, *Daphne gnidioides*, *Euphorbia rigida*, *Geranium lucidum*, *Lagoecia cuminoides*, *Legousia speculum-veneris*, *Leontodon tuberosus*, *Medicago minima* var. *minima*, *Minuartia anatolica* var. *anatolica*, *Oryzopsis coerulescens*, *Poa bulbosa*, *Quercus coccifera*, *Sanguisorba verrucosa*, *Scandix stellata*, *Securigera cretica*, *Sherardia arvensis*, *Silene odontopetala*, *Stachys cretica* subsp. *smyrnaea*, *Styrax officinalis*, *Torilis arvensis* subsp. *neglecta*, *Trifolium lucanicum*, *Trifolium stellatum* var. *stellatum*.

Dominant species: *Quercus coccifera*.

Nerium oleander-Platanus orientalis forest

Riparian forests on the Bencik Mountain are formed by this vegetation type ranging between 501 and 565 m. The vegetation type is found on the limeless brown soil formed by the phyllite rock. It generally prefers southern aspects. The inclination is not high. The general cover of the vegetation type is between 60% and 70%. The vegetation type consists of three vertical layers. The tree layer cover is 45-70% and the height is 10-25 m; the shrub layer cover is 45-70% and the height is 3-6 m; the herb layer cover is 5-60%, and the height is 1 m.

Diagnostic species: *Campanula lyrata* subsp. *lyrata*, *Crataegus monogyna* subsp. *monogyna*, *Dracunculus vulgaris*, *Euphorbia peplus* var. *peplus*, *Geranium purpureum*, *Hedera helix*, *Juncus acutus*, *Mentha longifolia*, *Micromeria graeca* subsp. *graeca*, *Muscari comosum*, *Myrtus communis* subsp. *communis*, *Nerium oleander*, *Plantago lanceolata*, *Platanus orientalis*, *Prunella vulgaris*, *Viola odorata*

Constant species: *Asparagus acutifolius*, *Briza maxima*, *Campanula lyrata* subsp. *lyrata*, *Crataegus monogyna* subsp. *monogyna*, *Crepis sancta*, *Dactylis glomerata* subsp. *hispanica*, *Dracunculus vulgaris*, *Euphorbia peplus* var. *peplus*, *Geranium purpureum*, *Hedera helix*, *Juncus acutus*, *Mentha longifolia*, *Micromeria graeca* subsp. *graeca*, *Muscari comosum*, *Myrtus communis* subsp. *communis*, *Nerium oleander*, *Plantago lanceolata*, *Platanus orientalis*, *Prunella vulgaris*, *Sanguisorba minor* subsp. *muricata*, *Trifolium campestre*, *Viola odorata*.

Dominant species: *Nerium oleander*, *Platanus orientalis*.

Vicia lathyroides-Pinus nigra subsp. pallasiana forest

This forest represents the Anatolian black pine-dominated forests in the region. It appears above 1231 m and forms the highest elevation belt of the mountain. It occurs on the brown forest soil, which is formed by the marble rock. The inclination changes between 30° and 45°.The general cover of the vegetation type is between 70% and 80%. The vegetation type consists of three vertical layers. The tree layer cover is 60-80% with the height of 15-25 m, the shrub layer cover is 5-10% with the height of 0.1-3 m, and the herb layer cover is 10-80% with the height of 0.3-0.5 m.

Diagnostic species: *Galium penduliflorum*, *Juniperus foetidissima*, *Lamium garganicum* subsp. *striatum* var. *striatum*, *Origanum hypericifolium*, *Pinus nigra* subsp. *pallasiana*, *Vicia lathyroides*

Constant species: *Anthemis cretica* subsp. *albida*, *Aubrieta deltoidea*, *Doronicum orientale*, *Galium pendulifolium*, *Juniperus foetidissima*, *Lamium garganicum* subsp. *striatum* var. *striatum*, *Milium pedicellare*, *Origanum hypericifolium*, *Pinus nigra* subsp. *pallasiana*, *Poa bulbosa*, *Quercus coccifera*, *Veronica cymbalaria*, *Vicia lathyroides*.

Dominant species: *Pinus nigra* subsp. *pallasiana*.

Aegilops triuncialis-Clypeola jonthlaspi regressive successional stage

Aegilops triuncialis-Clypeola jonthlaspi regressive successional stage has developed around 1299-1396 m. The vegetation type is located on brown forest soil, which consists of marble rocks found in the Fire Tower area, Buruncuk Hill, and their surroundings in the area. The inclination changes between5° and 45°. It can be found at almost all kind of aspects. The general coverage of this vegetation type is 60-90%: (a) tree layer, 3-10%, a height of 0-0.1 m; (b) shrub layer, 5-90%, a height of 0.1-2 m; (c) herb layer, 50-90 %, a height of 0.2-0.5 m. *Q. coccifera*, one of the most characteristic species of macchia vegetation in the region often occurs as dominant in this community. Although *Q. coccifera* represents reduced distribution and does not appear through all distribution of the vegetation type, its local dominancy may be an indication of the regression and successional process of the *Aegilops triuncialis-Clypeola jonthlaspi* regressive successional stage.

Diagnostic species: *Aegilops triuncialis*, *Anchusa hybrida*, *Buglossoides arvensis*, *Centaurea cadmea*, *Centaurea urvillei*, *Clypeola jonthlaspi*, *Cyanus segetum*, *Erodium cicutarium*, *Lamium amplexicaule*, *Moenchia mantica*, *Neslia paniculata* subsp. *thracica*, *Ornithogalum armeniacum*, *Papaver argemone*, *Saxifraga tridactylites*, *Scandix iberica*, *Sedum album*, *Sedum amplexicaule*, *Valantia hispida*, *Valerianella balansae*

Constant species: *Aegilops triuncialis*, *Ajuga chamaepitys*, *Alyssum fulvescens* var. *fulvescens*, *Alyssum smyrnaeum*, *Anchusa hybrida*, *Anthemis cretica* subsp. *albida*, *Aubrieta deltoidea*, *Bromus hordeaceus* subsp. *hordeaceus*, *Buglossoides arvensis*, *Centaurea cadmea*, *Centaurea urvillei*, *Clypeola jonthlaspi*, *Crepis sancta*, *Cyanus segetum*, *Erodium cicutarium*, *Lamium amplexicaule*, *Moenchia mantica*, *Myosotis ramosissima*, *Neslia paniculata* subsp. *thracica*, *Ornithogalum armeniacum*, *Papaver argemone*, *Poa bulbosa*, *Ranunculus marginatus*, *Saxifraga tridactylites*, *Scandix iberica*, *Sedum album*, *Sedum amplexicaule*, *Trifolium stellatum* var. *stellatum*, *Valantia hispida*, *Valerianella balansae*, *Verbascum pinardii*.

Dominant species: *Quercus coccifera*.

Chorology and ordination of the vegetation units – *Horologija i ordinacija vegetacijskih jedinica*

It was found that the vegetation types in the study area generally contain Mediterranean elements due to their location in the Mediterranean phytogeographic region. As the altitude increases in the communities, the effect of Irano-Turanian elements is found, and in humid and shaded areas, there are Euro-Siberian elements.

Hymenocarpos circinnatus-Pinus brutia forest has a total of fifty-two taxa, containing 42.3% Mediterranean, 57.7% pluri-regional elements, and 2 LC (Least Concern) category endemics. *Sideritis albiflora* and *Stachys cretica* subsp. *smyrnaea* are the endemics of the community. *Daphne gnidioides-Quercus coccifera* macchia has a total of forty-six taxa, containing 43.48% Mediterranean, 4.35% Euro-Siberian, 6.52% Irano-Turanian, 45.65% pluri-regional elements, and 3 LC) category endemics. *Minuartia anatolica* var. *anatolica*, *Stachys cretica* subsp. *smyrnaea*, and *Verbascum bellum* are the endemics in the community. *Nerium oleander-Platanus orientalis* forest has a total of fourteen taxa, containing 15% Mediterranean, 5% Euro-Siberian, and 80% pluri-regional elements. *Vicia lathyroides-Pinus nigra* subsp. *pallasiana* forest contains 28.57% Mediterranean and 71.43% pluri-regional elements, with 2 endemics in the LC category. The endemic species in the community are *Galium penduliflorum* and *Origanum hypericifolium*. *Aegilops triuncialis-Clypeola jonthlaspi* regressive successional stage has a total of fifty-two taxa, containing 26.92% Mediterranean, 1.92% European Siberian, 3.85% Iranian Turanian, and 67.31% pluri-regional elements, and 2 LC (Least Concern), 1 NT (Near Threatened), 1 VU (Vulnerable), and 1 CR (Critically Endangered) endemic taxa. *Astragalus condensatus* and *Astragalus hirsutus* are in the LC category, *Erysimum carium* is in the CR category, *Phlomis angustissima* is in the VU category, and *Verbascum pinardii* is in the NT category of endemics (Table 2).

The NMDS ordination of the relevés with the passive projection of topographical factors is seen in Figure 3. The floristic differentiation of the vegetation types and the effects of topographical factors on their differentiation are clear. The left side of the ordination is formed by the *Hymenocarpos circinnatus-Pinus brutia* forest, while the *Aegilops triuncialis-Clypeola jonthlaspi* regressive successional stage occurs on the right side. *Daphne gnidioides-Quercus coccifera* macchia is at the upper part of the ordination, and the lower side is formed by the vegetation types of *Nerium oleander-Platanus orientalis* and *Vicia lathyroides-Pinus nigra* subsp. *pallasiana* forests. There is a clear gradient of elevation and aspect through axes 1 and 2, respectively.

Vicia lathyroides-Pinus nigra subsp. *pallasiana* forests and *Aegilops triuncialis-Clypeola jonthlaspi* regressive successional stage are found in high-altitude belts of the mountain (Figures 3, 4). The *Hymenocarpos circinnatus-Pinus brutia* forest is found from the lower to the higher elevations. On the other hand, the communities of *Daphne gnidioides-Quercus coccifera* macchia and *Nerium oleander-Platanus orientalis* forest are found at lower elevations.

Table 2. Distribution of taxa in phytogeographic regions in the study area.
Tablica 2. Raširenost taksona u fitogeografskim regijama na području istraživanja.

	Phytogeographical regions (Number / (%))				
Community name	Endemic	Mediterranean	Euro Siberian	Irano Turanian	Pluri regional
Hymenocarpos circinnatus-Pinus brutia forest	2 (3.85%)	22 (42.3%)	0	0	30 (57.7%)
Daphne gnidioides-Quercus coccifera macchia	3 (6.52%)	20 (43.48%)	2 (4.35%)	3 (6.52%)	21 (45.65%)
Nerium oleander-Platanus orientalis forest	0	3 (15%)	1 (5%)	0	16 (80%)
Vicia lathyroides-Pinus nigra subsp. *pallasiana* forest	2 (14.29%)	4 (28.57%)	0	0	10 (71.43%)
Aegilops triuncialis-Clypeola jonthlaspi regressive successional stage	5 (9.62%)	14 (26.92%)	1 (1.92%)	2 (3.85%)	35 (67.31%)

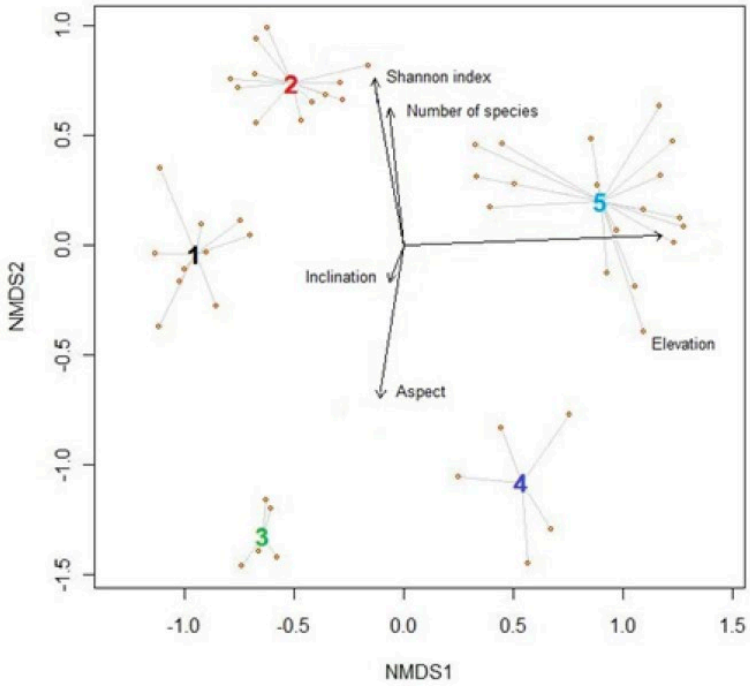


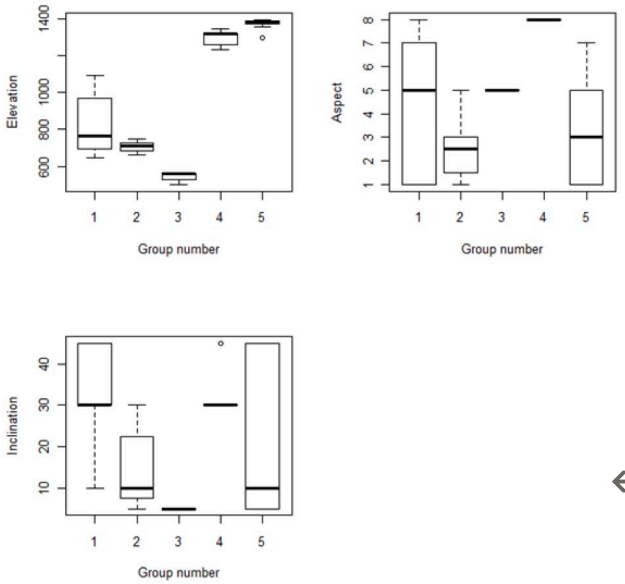
Figure 3. NMDS ordination of the vegetation types: 1. *Hymenocarpos circinnatus-Pinus brutia* forest, 2. *Daphne gnidioides-Quercus coccifera* macchia, 3. *Nerium oleander-Platanus orientalis* forest, 4. *Vicia lathyroides-Pinus nigra* subsp. *pallasiana* forest, 5. *Aegilops triuncialis-Clype-ola jonthlaspi* regressive successional stage)

Slika 3. NMDS ordinacija vegetacijskih tipova: 1. šuma *Hymenocarpos circinnatus-Pinus brutia*, 2. makija *Daphne gnidioides-Quercus coccifera*, 3. šuma *Nerium oleander-Platanus orientalis*, 4. šuma *Vicia lathyroides-Pinus nigra* subsp. *pallasiana*, 5. garig *Aegilops triuncialis-Clype-ola jonthlaspi*

While the forests of *Nerium oleander-Platanus orientalis* prefer southern aspects, *Vicia lathyroides-Pinus nigra* subsp. *pallasiana* mostly occur in northern aspects. Other vegetation types do not show specific preferences in terms of aspect.

The *Nerium oleander-Platanus orientalis* forest is found on low inclinations. It has been determined that other vegetation types are located on inclinations between 10° and 45°.

There is a clear difference between plant communities in terms of species richness and diversity (Figures 3, 5). The *Vicia lathyroides-Pinus nigra* subsp. *pallasiana* forest has the least species richness among the vegetation types.The Shannon diversity index also shows that the *Vicia lathyroides-Pinus nigra* subsp. *pallasiana* forests have low species diversity compared to the other vegetation types (Figure 5).



← **Figure 4.** Box-whisker diagrams of topographical variables for each plant community on the Bencik Mountain.

Slika 4. Box-whisker dijagrami topografskih varijabli za pojedine biljne zajednice na planini Bencik.

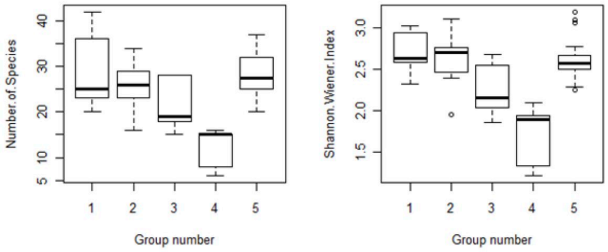


Figure 5. Box-whisker diagrams species richness and diversity for each vegetation type on the Bencik Mountain.

Slika 5. Box-whisker dijagrami topografskih varijabli za bogatstvo i raznolikost vrsta za svaki vegetacijski na planini Bencik.

See Figures 2 and 3 for the explanation of group numbers. – : Median, ☐ : 25%-75%, I : Non-outlier range, ○ : outliers, ✳ : extremes
Oznake zajednica objašnjene su na Slikama 2. i 3. – : Medijan, ☐ : 25 %-75 %, I : Raspon koji nije izuzetak, ○ : ekstremi, ✳ : krajnosti

DISCUSSION
RASPRAVA

The vegetation of the Bencik Mountain is distributed in the meso-Mediterranean and the supra-Mediterranean belts, consisting of five different plant communities. Although topographic conditions seem to have an effect on the floristic differentiation of the communities, secondary communities have also emerged as a result of human-induced deterioration. In addition to zonal pine forests of *P. brutia* and *P. nigra*, the riparian ecosystems in the area are characterized by the *Platanus orientalis* dominated forests.

The effects of elevation and aspect on floristic differentiation can be the result of climatic variation in the study area, which has also been shown in various studies carried out in Mediterranean Türkiye before (Fontaine et al. 2007). The upper belts of the study area are formed by the *Vicia lathyroides-Pinus nigra* subsp. *pallasiana* forest and *Aegilops triuncialis-Clypeola jonthlaspi* regressive successional stage, while the *Daphne gnidioides-Quercus coccifera* macchia and *Nerium oleander-Platanus orientalis* forests occur in the lower belts. Differently, *Hymenocarpos circinnatus-Pinus brutia* forest is found in meso- and supra-Mediterranean vegetation belts.

Although *P. brutia* (Turkish red pine) forests in Türkiye were classified under different alliances in the past, they were grouped under two alliances in recent years (Bonari et al. 2021; Kavgacı et al. 2021). While lower-elevation Turkish red pine forests are classified under the alliance *Pinion brutiae*, upper ones represent the alliance *Styraco officinalis-Pinion brutiae*. Both alliances are placed under *Pinetalia halepensis* and *Pinetea halepensis*. In our case, since the distribution of *Pinus brutia* forests is in meso- and supra-Mediterranean, it is suitable to place them under *Styraco officinalis-Pinion brutiae*.

Some plant communities of Turkish red pine at association level in SW Türkiye were identified. While some of them were invalidly published according to the ICPN rules (Theurillat et al. 2021), some show certain floristic differentiation from the community on the Bencik Mountain due to the geographical and climatic variation. *Aetheorhiza-Pinetum brutiae* and *Phlomido bourgaei-Pinetum brutiae*, both of which were described in Marmaris province by Vural et al. (1995) and Akman et al. (1998), respectively, and *Junipero phoeniceae-Pinetum brutiae* in the Bodrum peninsula (Akman et al. 1998) are the Turkish pine forests identified in SW Türkiye. However, all these communities represent the Eu- and thermo-Mediterranean distributions of the species (*Pinion brutiae*) and are floristically different. There are also other studies from higher elevation in the surrounding regions in Southern Mediterranean Türkiye: *Asparago acutifoli-Pinetum brutiae* identified in the Finike province (Antalya) (Karaköse and Terzioğlu 2021), and *Glycyrrhizo asymetricae-Pinetum brutiae*, and *Phlomido leucophractae-Pinetum brutiae* in the Antalya Gulf (Kurt et al. 2015). Similarly, there are also other studies from the northern part of Mediterranean Türkiye (Ketenoğlu et al. 2010). All of these communities have a different floristic composition than the Turkish pine forests on the Bencik Mountain (*Hymenocarpos circinnatus-Pinus brutia* forest). Therefore, we decided to describe a new association of *P. brutia* forests on the Bencik Mountain as *Hymenocarpo circinnati-Pinetum brutiae* Aytepe et Kavgacı ass. nova under the alliance *Styraco officinalis-Pinion brutiae* (*Pinetalia halepensis* and *Pinetea halepensis*).

Pinus nigra subsp. *pallasiana* has a natural distribution in southern Europe and Türkiye. The Anatolian black pine (*Pinus nigra* subsp. *pallasiana*) is one of the subspecies of black pine, growing naturally as a widespread mid-elevation species in the southern, western, and northern Anatolian Mountains (Akman 1995). Its distribution is placed in a gradient from the sea-effected climate area to the steppe vegetation of inner Anatolia. Anatolian black pine forests in Türkiye were grouped under two different alliances: *Cisto laurifolii-Pinion pallasianae* in western Euxine Türkiye and *Adenocarpo complicati-Pinion pallasianae* in Mediterranean Türkiye (Akman, 1995; Ketenoğlu et al. 2010). Phytosociological studies were carried out in Anatolian black pine forests in SW Türkiye, some of which were not published. But these studies (see Bekat 1987; Gemici 1988; Serin 1996; Kargıoğlu and Tatlı 2005; Sağlam 2007) represent the inner land distributions of Anatolian black pine in SW Türkiye and show strict floristic differentiation from the *Vicia lathyroides-Pinus nigra* subsp. *pallasiana* forest on the Bencik Mountain, which is under the effect of sea climate. In addition to these studies, other community descriptions of Anatolian black pine forests were also made in other parts of Mediterranean Türkiye. However, they also have stricter floristic differentiation than the community on the Bencik Mountain due to the geographical distance and climatic variation. In this context, the *Vicia lathyroides-Pinus nigra* subsp. *pallasiana* forest on the Bencik Mountain is defined as a new association: *Vicio lathyroidis-Pinetum pallasianae* Aytepe et Kavgacı ass. nova under *Adenocarpo-Pinion pallasianae, Erico-Pinetalia,* and *Erico-Pinetea*. The association represents the meso-Mediterranean Anatolian black pine forests in areas under sea climate in SW Türkiye. The poorer species richness and diversity of this vegetation type than the other vegetation types in the region can be a result of higher tree layer coverage.

Platanus orientalis (Oriental plane) establishes gallery-type forests on narrow valley bases and along rivers in almost every region of Türkiye. There are few studies on the Oriental plane in Mediterranean Türkiye (Ayaşlıgil 1987; Çinbilgel and Gökçeoğlu 2010). The *Nerio oleandri-Platanetum orientalis* vegetation type, which was first identified in Albania (Kárpáti 1962), also characterizes the *P. orien-*

talis riparian forests in Anatolia. This association is placed under *Platanion orientalis*, *Populetalia albae*, and *Alno glutinosae-Populetea albae*.

Macchia is an evergreen, sclerophyllous shrubland with a more or less closed canopy structure. It is a stage of vegetation succession towards the forest, a replacement stage of climax forests, or even permanent communities on xeric sites. These stages are maintained by grazing, forest clearing, and fires. Unless the succession is interrupted, macchia develops into a sclerophyllous forest, but the species composition is nearly the same (Kavgacı et al. 2017). Macchia and sclerophyllous forests are therefore often treated together in vegetation classification (Čarni et al. 2011, 2018; Kavgacı et al. 2017).

Quercus coccifera-dominated macchia and sclerophyllous forests in Türkiye are classified under different alliances: *Arbuto andrachnes-Quercion cocciferae, Ceratonia siliquae-Pistacion lentisci* and *Quercion cocciferae* (Kavgacı et al. 2021). However, the upland disturbances with poorer Mediterranean species support classification under *Quercion cocciferae*. The *Daphne gnidioides-Quercus coccifera* macchia on the Bencik Mountain was classified under the alliance *Quercion cocciferae* of *Quercetalia cocciferae* and *Quercetea ilicis*. Such upland *Quercus coccifera* macchia and sclerophyllous forests were intensively subjected to phytosociological studies. However, most of them were not published, as shown in the supplementary material by Kavgacı et al. (2021). The identified associations of *Quercion cocciferae* in SW Türkiye were identified (Sağlam 2013; Karaköse and Terzioğlu 2021) and it can be seen that they include a different floristic composition than the one on the Bencik Mountain. They also appear on calcareous bedrock differently from the *Daphne gnidioides-Quercus coccifera* macchia since they prefer phyllite rocks. *Quercus coccifera* also has distributions in other parts of the Mediterranean basin beyond Türkiye, but represents a different syntaxonomical ranking (see Tsiourlis et al. 2009). Therefore, we decided to describe the *Daphne gnidioides-Quercus coccifera* macchia as a new association: *Daphno gnidiois-Quercetum cocciferae* Aytepe et Kavgacı ass. nova under *Quercion cocciferae*, *Quercetalia cocciferae,* and *Quercetea ilicis*.

Aegilops triuncialis-Clypeola jonthlaspi is a regressive successional stage and as seen by the floristic composition, *Q. coccifera* appears as the only dominant species in this community. However, it represents local dominancy, and the rest of the vegetation type shows open habitat character. The low distribution of *Q. coccifera* and the high presence of annual and ruderal plants indicate the grazing effect and degradation of upland *Q. coccifera* shrubland in the study area. The *Q. coccifera* communities are frequently subject to anthropogenic pressures such as fires, clearing, and overgrazing (Türkmen and Düzenli 2005), which result in a regressive ruderal vegetation type (Jasprica et al. 2016). Since there is not sufficient knowledge on regressive successional stage ecosystems in the study regions and a specific assessment is required for them, a syntaxonomic classification has not been done for this vegetation type.

According to the syntaxonomical assessment carried out above, the syntaxonomical scheme is formed as follow:

Syntaxonomical scheme – Sintaksonomska shema

Pinetea halepensis Bonari et Chytrý in Bonari et al. 2021
Pinetalia halepensis Biondi, Blasi, Galdenzi, Pesaresi et Vagge 2014
Styraco officinalis-Pinion brutiae Bonari et al. 2021
Hymenocarpo circinnati-Pinetum brutiae Aytepe et Kavgacı ass. nova (Holotypus: Table 1, relevé: 2)
Quercetea ilicis Br.-Bl. ex A. Bolòs et O. de Bolòs in A. Bolòs y Vayreda 1950
Quercetalia cocciferae Zohary 1955
Quercion cocciferae Zohary 1955.
Daphno gnidiois-Quercetum cocciferae Aytepe et Kavgacı ass. nova (Holotypus: Table 1, relevé 9)
Erico-Pinetea Horvat 1959
Erico-Pinetalia Horvat 1959 nom. conserv. propos.
Adenocarpo-Pinion pallasianae Quézel, Barbero et Akman 1993
Vicio lathyroidis-Pinetum pallasianae Aytepe et Kavgacı ass. nova (Holotypus: Table 1, relevé: 24)
Alno glutinosae-Populetea albae P. Fukarek et Fabijanić 1968
Populetalia albae Br.-Bl. ex Tchou 1949 nom. conserv. propos.
Platanion orientalis I. Kárpáti et V. Kárpáti 1961
Nerio oleandri-Platanetum orientalis Kárpáti and Kárpáti 1961
Aegilops triuncialis-Clypeola jonthlaspi regressive successional stage

The appearance of different forest and shrubland communities in a very narrow area in the study site indicate high vegetation diversity in the region. In addition to the endemism, the occurrence of endangered species in the area also show the diversity and how vulnerable it is. The regressive successional community can be accepted as the indication of the level of vegetation degradation in the area. Therefore, the sensibility of the vegetation diversity in the region must be taken into account during forest, land management and nature conservation studies.

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STATEMENTS AND DECLARATIONS
IZJAVE I DEKLARACIJE

H.A.A. conceived of the idea and carried out vegetation studies; H.A.A. and A.K. performed the statistical analyses; HAA and AK wrote the manuscript. No funding was received for conducting this study. The corresponding authors declare that there is no conflict of interest.

REFERENCES
LITERATURA

- Akman, Y., 1995: Forest Vegetation of Turkey, TR: Ankara University Publications, 450 p, Ankara (in Turkish).
- Akman, Y., L. Kurt, E. Demiryürek, P. Quézel, F. Kurt, H. Evren, M. Kucukoduk, 1998: Les groupements a *Pinus brutia* sur roches ultra-basiques et calcaires, dans la région de Marmaris et Bodrum (Mugla) a l'étage thermo-méditerranéen du sud-ouest Anatolien (Turquie), Ecologia Mediterranea, 24(1): 63–71 (in French).
- Anonymous, 1998: Mugla Province Land Asset, T. C. Prime Ministry General Directorate of Rural Services Publications, Ankara, 132 p (in Turkish).
- Ayaşlıgil, Y., 1987: Der Köprülü Kanyon Nationalpark. seine Vegetation und ihre Beeinflussung durch den Menschen Landschaftsökologie, Landschaftsökologie Weihenstephan Freising.
- Bekat, L., 1987: The vegetation of Mount Barla (Eğirdir), Doğa Türk Botanik Dergisi, 11: 270-305 (in Turkish).
- Bergmeier, E., H. Walentowski, C. Güngöroglu, 2018: Turkish forest habitat types an annotated conspectus based on the EU habitats directive with suggestions for an upgrade, In: Güngöroglu C. (Ed.) Practicability of EU Natura 2000 concept in the forested areas of Turkey, TR: Turkey Foresters' Association, pp. 134–292, Ankara.
- Bonari, G., G. F. Fernández, S. Çoban, T. Monteiro-Henriques, E. Bergmeier, Y.P. Didukh, F. Xystrakis, C. Angiolini, K. Chytrý, A.T. Acosta, E. Agrillo, J.C. Costa, J. Danihelka, S. M. Hennekens, A. Kavgacı, I. Knollova, C. S. Neto, C. Sağlam, Ž. Škvorc, et al., 2021: Classification of the Mediterranean lowland to submontane pine forest vegetation, Appl Veg Sci, 24 :e12544, https://doi.org/10.1111/avsc.12544
- Blassi, C, S. Burrascano, 2013: The role of plant sociology in the study and management of European forest ecosystems, iForest-Biogeosciences and Forestry, https://doi:10.3832/ifor0913-006
- Braun-Blanquet, J., 1932: Plant Sociology, McGraw-Hill book company, New York, USA.
- Čarni, A., N. Juvan, P. Košir, A. Marinšek, A. Paušič, U. Šilc, 2011: Plant communities in gradients, Plant Biosystems, 145: 54-64, https://doi.org/10.1080/11263504.2011.602730
- Čarni, A., V. Matevski, M. Kostadinovski, R. Ćušterevska, 2018: Scrub communities along a climatic gradient in the southern Balkans: maquis, pseudomaquis and shibljak., Plant Biosystems, 152: 1165-1171, https://doi.org/10.1080/11263504.2018.1435567
- Chytrý, M., L. Tichý, J. Holt, Z. Botta-Dukát, 2002: Determination of diagnostic species with statistical fidelity measures, Journal of Vegetation Science, 13: 79-90, https://doi.org/10.1111/j.1654-1103.2002.tb02025.x
- Chytrý, M., S. M. Hennekens, B. Jiménez-Alfaro, I. Knollová, J. Dengler, F. Jansen et al., 2016: European Vegetation Archive (EVA): an integrated database of European vegetation plots, Applied Vegetation Science, 19(1): 173-180, https://doi.org/10.1111/avsc.12191
- Chytrý, M., L. Tichý, S. M. Hennekens, I. Knollová, J. A. M. Janssen, J. S. Rodwell et al., 2020: EUNIS habitat classification: Expert system, characteristic species combinations and distribution maps of European habitats, Applied Vegetation Science, 23(4): 648-675. https:// doi.org/10.1111/avsc.12519
- Çinbilgel, İ., M. Gökçeoglu, 2010: The vegetation of Altınbeşik Cavern National Park (İbradı-Akseki/Antalya-Turkey), A Syn-ecological Study, Spanish Journal of Rural Development, 1(2):1–17
- Çoban, S., W. Willner, 2019: Numerical classification of the forest vegetation in the Western Euxine Region of Turkey, Phytocoenologia, 49: 71-106, https://doi.org/10.1127/phyto/2018/0274
- Davis, P. H., 1965-1982: Flora of Turkey and East aegean Islands, 1-9, Edinburgh University Press Edinburgh
- Davis, P. H., R. R. Mill, K. Tan (ed), 1988: Flora of Turkey and the East Aegean Islands, Vol 10 UK: Edinburgh University Press Edinburgh
- Ekim, T., Koyuncu. M., Vural, M., Duman, H., Aytaç, Z., Adıgüzel, N. (2000). Red Book of Turkish Plants. Publication No: 18, Ankara, 246p.
- Fontaine, M., R. Aerts, K. Özkan, A. Mert, S. Gülsoy, H. Suel, M. Waelkens, B. Muys, 2007: Elevation and exposition rather than soil types determine communities and site suitably in Mediterranean mountain forests of southern Anatolia, Turkey, Forest Ecology and Management, 247: 18-25.
- Gemici, Y., 1988: Vegetation of Akdağ (Afyon-Denizli) and its environs, Doğa Turkish Botanical Journal, 12: 8-57 (in Turkish).
- Güner, A. (ed), 2012: Turkey Plants List, ANG/Nezahat Gökyiğit Botanical Garden, İstanbul Turkey (in Turkish).
- IUCN, (2003). Red List Categories: Version 3.1. Prepared by the IUCN Species Survival Commission. Gland, Switzerland.
- Jasprica, N., Ž. Škvorc, K. Dolina, M. Ruščić, S. Kovačić, J. Franjic, 2016: Composition and ecology of the *Quercus coccifera* L. communities along the eastern Adriatic coast (NE Mediterranean), Plant Biosystems, 150(6): 1140-1155, http://dx.doi.org/10.1080/11263504.2014.1001461
- Karaköse, M., S. Terzioğlu, 2021: Numerical classification and ordination of Finike (Antalya) Forest vegetation, Biologia, 76: 3631-3645 https://doi.org/10.1007/s11756-021-00910-x
- Kargıoğlu, M., A. Tatlı, 2005: A phytosociological research on the forest vegetation of Yandağ (Isparta-Turkey), Pakistan Journal of Biological Sciences, 8: 929-939.
- Kárpáti, I., 1962: Überblick der zönologischen und ökologischen Verhältnisse der Auenwälder des Westbalkans, Mitt Ostalp-Din Pflanzensoz Arbeit, 2: 101-106.
- Kayan, İ., 1979: Geomorphology of Muğla-Yatağan Environment, Associate Professor Thesis, Ankara University Faculty of Language History and Geography, Ankara, (in Turkish).
- Kavgacı, A., U. Šilc, S. Başaran, A. Marinšek, M. A. Başaran, P. Košir et al., 2017: Classification of plant communities along postfire succession in *Pinus brutia* (Turkish red pine) stands in Antalya (Turkey), Turkish Journal of Botany, 41: 299-307, https://doi.org/10.3906/ bot-1609-34
- Kavgacı, A., N. Balpınar, H. H. Öner, M. Arslan, G. Bonari, M. Chytrý, A. Čarni, 2021: Classification of forest and shrubland vegetation in Mediterranean Turkey, Applied Vegetation Science, 24: e12589, https://doi.org/10.1111/avsc.12589
- Ketenoğlu, O., G. N. Tuğ, U. Bingol, F. Geven, L. Kurt, K. Güney, 2010: Synopsis of syntaxonomy of Turkish forests, Journal of Environmental Biology, 31:71-80.
- Kurt, L., A. O. Ketenoğlu, Y. Akman, E. Özdeniz, F. Şekerciler, A. Bölükbaşı, B. G. Özbey, 2015: Syntaxonomic Analysis of The Preforest and Forest Vegetation in The Thermo-and Eumedi-

terranean Zone Around Antalya Gulf. Turkey, Turk J Bot 39: 487-498

- Meteorology General Directorate, 2018: Temperature, precipitation, humidity and wind values of Muğla Center between 1968-2017 Muğla, 48 p, (in Turkish).
- Mucina, L., H. Bültmann, K. Dierßen et al., 2016: Vegetation of Europe: Hierarchical floristic classification system of vascular plant, bryophyte, lichen, and algal communities, Appl Veg Sci, doi:10.1111/avsc.12257
- Özel, N., 1996: Studies on Vegetation of Beşparmak Mountains and Dilek Peninsula, 1st ed. İzmir Turkey: Aegean Forestry Research Directorate Technical Bulletin Series, (in Turkish).
- Preislerova, Z., B. Jiménez-Alfaro, L. Mucina et al., 2022: Distribution maps of vegetation alliances in Europe, Applied Vegetation Science, DOI: 10.1111/avsc.12642
- Quézel, P., M. Barbero, Y. Akman, 1992: Typification of syntaxa described in the eastern Mediterranean region (in French), Ecologia Mediterranea, 18: 81-87
- Sağlam, C., 2007: The forest and shrub vegetation of Davras Mountain and surroundings (Isparta), Süleyman Demirel University Journal of Natural and Applied Science, 11: 140-157. https://doi.org/10.19113/sdufbed.62447, (in Turkish)
- Sağlam, C., 2013: A phytosociological study of the forest, shrub, and steppe vegetation of Kızıldağ and environs (Isparta, Turkey), Turk J Bot, 37: 316-335. doi:10.3906/bot-1205-46
- Serin, M., 1996: The vegetation of eastern part of Dedegöl (Anamas) Mountain and Kurucuova-Yeşildağ (Beyşehir-Konya) and its surroundings, Selçuk University Faculty of Science Journal of Science, 13:28-49 (in Turkish).
- Theurillat, J-P., W. Willner, F. FernándezGonzález, H. Bültmann, A. Čarni, D. Gigante, L. Mucina, H. Weber, 2021: International Code of Phytosociological Nomenclature. 4th edition, Appl Veg Sci, 24: e12491. https://doi.org/10.1111/avsc.12491
- Tichý, L., 2002: JUICE software for vegetation classification, Journal of Vegetation Science, 13: 451-453.
- Tichý, L., M. Chytrý, 2006: Statistical determination of diagnostic species for site groups of unequal size, Journal of Vegetation Science, 17(6): 809. https://doi.org/10.1111/j.1654-1103.2006.tb02504.x
- Tsiourlis, G., P. Konstantinidis, P. Xofis, 2009: Syntaxonomy and synecology of *Quercus coccifera* Mediterranean shrublands in Greece, Journal of Plant Biology, 52: 433-447.
- Türkmen, N., A. Düzenli, 2005: Changes in floristic composition of *Quercus coccifera* macchia after fire in the Çukurova region (Turkey), Ann Bot Fenn, 42: 453-460.
- Uğurlu, E., J. Roleček, E. Bergmeier, 2012: Oak woodland vegetation of Turkey a first overview based on multivariate statistics, Applied Vegetation Science, 15: 590-608. 10.1111/j.1654-109X.2012.01192.x.
- Vural, M., H. Duman, A. Güner, A. A. Dönmez, H. Şağban, 1995: The Vejetation of Köyceğiz-Dalyan (Muğla) Specially Protected Area, Turk J Bot, 19: 431-476.

SAŽETAK

Ova studija provedena je kako bi se utvrdili raznolikost vegetacije i ekološki gradijenti na planini Bencik u jugozapadnoj Anatoliji (Turska), koja je žarište raznolikosti biljaka. Terensko uzorkovanje provedeno je u skladu s metodologijom Braun-Blanqueta. Za klasifikaciju biljnih zajednica korištena je hijerarhijska klaster analiza. Ekološka interpretacija definiranih zajednica provedena je metodom nemetričkog višedimenzionalnog skaliranja s pasivnom projekcijom topografskih varijabli. Identificirano je pet biljnih zajednica koje pripadaju različitim tipovima vegetacije (šuma, makija i regresivna sukcesivna faza). Osim gariga, ostali tipovi vegetacije opisani su na razini asocijacije, od čega su tri opisane po prvi puta. Šume u kojima dominira bor predstavljene su asocijacijama *Hymenocarpo circinnati-Pinetum brutiae* unutar sveze *Styraco officinalis-Pinion brutiae* (*Pinetalia halepensis, Pinatea halepensis*) i *Vicio lathyroidis-Pinetum pallasianae* unutar sveze *Adenocarpo-Pinion pallasianae* (*Erico-Pinetalia, Erico-Pinetea*). Obje su nove asocijacije. Poplavna područja predstavljena su asocijacijom *Nerio oleandri-Platanetum orientalis* unutar sveze *Platanion orientalis* (*Populetalia albae, Alno glutinosae-Populetea albae*). Makija je predstavljena asocijacijom *Daphno gnidiois-Quercetum cocciferae*, novom asocijacijom koja pripada svezi *Quercion cocciferae* (*Quercetalia cocciferae, Quercetea ilicis*). Regresivna sukcesivna faza je predstavljen zajednicom *Aegilops triuncialis-Clypeola jonthlaspi*, koja je rezultat pretjerane ispaše i intenzivne ljudske upotrebe makije vrste *Quercus coccifera*. Floristička diferencijacija vegetacije na području istraživanja značajno je povezana s topografskim varijablama (nadmorska visina i ekspozicija). Ova studija ne samo da ukazuje na raznolikost vegetacijskog bogatstva na istraživanom području i njegovu vrijednost za očuvanje prirode, već također daje važan doprinos razumijevanju mediteranske vegetacije u Turskoj.

KLJUČNE RIJEČI: Planina Bencik, klasifikacija, Mediteran, ordinacija, Turska, vegetacija

Appendix

Table 1. Vegetation table of the Bencik Mountain. The vegetation plots are ordered according to the cluster analysis presented in Figure 2; group numbers correspond to the vegetation type numbers: 1. *Hymenocarpo circinnati-Pinetum brutiae,* 2. *Daphno gnidiois-Quercetum cocciferae,* 3. *Nerio oleandri-Platanetum orientalis,* 4. *Vicio lathyroidis-Pinetum pallasianae,* 5. *Aegilops triuncialis-Clypeola jonthlaspi community.*

Tablica 1. Vegetacijska tablica planine Bencik. Vegetacijske snimke poredane su prema klasterskoj analizi prikazanoj na slici 2; Brojevi skupina odgovaraju vegetacijskim tipovima: 1. *Hymenocarpo circinnati-Pinetum brutiae,* 2. *Daphno gnidiois-Quercetum cocciferae,* 3. *Nerio oleandri-Platanetum orientalis,* 4. *Vicio lathyroidis-Pinetum pallasianae,* 5. *Aegilops triuncialis-Clypeola jonthlaspi community.*

Running number / *Tekući broj*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Quadrat number / *Broj kvadrata*	1	2	3	4	5	18	19	20	21	22	6	7	8	9	10	11	12	13	14	15	16	17	38	39	40	49	50	23	24	25	47	48	26	27	28	29	30	31	32	33	34	35	36	37	41	42	43	44	45	46
Group number / *Broj skupine*	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Size of quadrat / *Veličina kvadrata* (m²)	900	900	900	900	900	900	900	900	900	900	256	256	256	256	256	256	256	256	256	256	256	256	256	256	256	256	256	900	900	900	900	900	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Elevation / *Nadmorska visina* (m)	647	704	650	771	693	754	1094	1068	887	967	663	693	709	706	670	675	716	726	719	729	738	748	563	560	565	529	501	1231	1260	1320	1344	1318	1396	1375	1373	1372	1372	1372	1385	1386	1386	1390	1390	1387	1299	1358	1370	1380	1370	1375
Exposure / *Orijentacija terena*	SE	W	SW	N	SW	N	NW	N	NW	E	NE	N	N	NE	NE	N	E	E	E	S	S	E	S	S	S	S	S	NW	NW	NW	NW	NW	S	S	S	S	S	S	E	N	N	N	N	W	NE	E	E	N	N	N
Inclination / *Nagib* (°)	45	30	45	30	30	45	30	10	10	45	10	10	10	30	30	10	10	5	5	30	5	15	5	5	5	5	5	30	30	30	45	30	45	45	30	45	45	45	5	5	5	10	5	5	10	5	10	20	30	5
Coverage total / *Ukupna pokrovnost* (%)	80	70	80	80	90	95	90	75	80	95	90	75	70	75	85	70	85	90	80	90	80	70	70	60	70	70	60	80	70	80	80	70	80	90	80	80	80	70	90	90	90	90	90	70	70	60	70	80	70	80
Coverage of trees / *Pokrovnost drveća* (%)	80	70	80	80	85	90	90	75	80	70	-	-	-	-	-	-	-	-	-	-	-	-	70	60	70	30	45	70	60	75	80	70	-	-	10	-	-	-	-	-	-	-	-	-	-	10	10	-	3	-
Height of trees / *Visina drveća* (m)	30	30	20	25	20	20	25	25	25	25	-	-	-	-	-	-	-	-	-	-	-	-	25	20	15	10	20	25	25	15	15	15	-	-	0.1	-	-	-	-	-	-	-	-	-	-	0.1	0.1	-	0.1	-
Coverage of shrubs / *Pokrovnost grmlja* (%)	55	20	20	25	25	20	60	50	15	25	90	75	70	75	85	70	85	90	80	90	80	70	50	50	50	70	45	5	5	5	10	5	60	80	80	5	-	-	80	25	25	30	90	70	-	60	40	60	50	50
Height of shrubs / *Visina grmlja* (m)	2.5	1	1	1.5	2	4	2	2.5	2	2.5	6	0.6	0.5	0.5	6	5	3	2	2	1.5	1	2	3	3.5	3	6	5	0.1	0.1	3	0.2	15	0.4	2	1.5	0.1	-	-	0.1	0.1	0.1	0.2	0.1	0.2	-	1	1	0.5	0.4	0.5
Coverage of herbs / *Pokrovnost prizemnog rašća* (%)	75	40	50	40	30	90	50	30	30	95	20	30	60	30	20	50	30	20	30	10	10	10	60	40	5	15	20	80	70	20	10	10	80	90	80	80	80	70	90	90	85	90	80	90	70	50	70	80	70	80
Height of herbs / *Visina prizemnog rašća* (m)	1.1	1	1	1	1	0.8	0.6	0.8	1	1	1	1	1	1	1.5	1	1.5	1	1	1	1	0.7	1	1	1	1	1	0.5	0.5	0.5	0.4	0.3	0.3	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.5	0.5	0.4	0.3	0.4	0.6
Latitude / *Zeljopisna širina*	37.23237 °N	37.23139 °N	37.22782 °N	37.23826 °N	37.24452 °N	37.23813 °N	37.23887 °N	37.23826 °N	37.23593 °N	37.23530 °N	37.27012 °N	37.27067 °N	37.27054 °N	37.27070 °N	37.27046 °N	37.26991 °N	37.26555 °N	37.26444 °N	37.26305 °N	37.26261 °N	37.26284 °N	37.26400 °N	37.24101 °N	37.23921 °N	37.23818 °N	37.23646 °N	37.23644 °N	37.24101 °N	37.23921 °N	37.23818 °N	37.23406 °N	37.23502 °N	37.23646 °N	37.23644 °N	37.23667°N	37.23670°N	37.23678 °N	37.23694 °N	37.23710 °N	37.23726 °N	37.23726 °N	37.23731 °N	37.23744 °N	37.23723 °N	37.23526 °N	37.23345 °N	37.23398 °N	37.23402 °N	37.23430 °N	37.23430 °N
Longitude / *Zemljopisna dužina*	28.01115 °E	28.01198 °E	28.01093 °E	28.00049 °E	28.00532 °E	28.00179 °E	28.00392 °E	28.00523 °E	28.00938 °E	28.00613 °E	28.10253 °E	28.10037 °E	28.09937 °E	28.09974 °E	28.10132 °E	28.10193 °E	28.10262 °E	28.10362 °E	28.10346 °E	28.10268 °E	28.10211 °E	28.10107 °E	28.04170 °E	28.04069 °E	28.04747 °E	28.04924 °E	2804944 °E	28.04170 °E	28.04069 °E	28.04747 °E	28.03702 °E	28.03750 °E	28.04924 °E	28.04944 °E	28.05014 °E	28.05017 °E	28.05030 °E	28.05029 °E	28.04932 °E	28.04957 °E	28.04965 °E	28.04977 °E	28.04988 °E	28.04895 °E	28.04153 °E	28.03930 °E	28.03853 °E	28.03862 °E	28.03866 °E	28.03804 °E
Diagnostic species / *Dijagnostičke vrste*																																																		
Pinus brutia var. *brutia*	5	4	5	5	5	5	5	4	4	4																																									
Hymenocarpos circinnatus	1	2	1		1				1	1		1																																							
Crepis vesicaria	2	1		1		2	2	2			1			1																																					
Crucianella latifolia			1		1	2	2	1	1	1		1						2	2		1																													
Scandix australis subsp. *grandiflora*	1	1	1		2																																												
Galium heldreichii	1	1	1		1																																												
Asplenium ceterach				2		4	2			3																																							
Quercus ithaburensis subsp. *macrolepis*			1			2	2	2																																								
Pilosella piloselloides subsp. *piloselloides*			1			1		1	1																																							
Sanguisorba minor subsp. *minor*						1	2	1	1																																							
Lathyrus aphaca var. *affinis*		2	1	1	1				1	2																		1																				1			

Running number / *Tekući broj*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Briza maxima	1	2	2	2		2	2	2	2													1		1		1	2																							
Cistus creticus	2		2	1		2	2	2	2									1	1	1	1	1													1	1														
Trifolium uniflorum	1	2	1	1					1																					2																				
Dactylis glomerata subsp. *hispanica*	1	1	1			1	2	1	1								1			1						1	1																							
Scorzonera elata	1		1		1			1					1																																					
Spiranthes spiralis		1	2	2																																														
Centaurea cariensis subsp. *maculiceps*						1	1	2																																										
Daphne gnidioides											2					2	2	2	1	1	2	2																								1				
Lagoecia cuminoides											1	2	2	2		2	1	1			1												1																
Legousia speculum-veneris											1	2			2	1	2	1				1																												
Aegilops umbellulata													1	1	1		1	1			1	1																											
Trifolium lucanicum		1											1	1	1	1	1	1			1	1																											
Styrax officinalis											2				3	3					1	1																											
Caucalis platycarpos			1								1	1			1					1	1	1																											
Euphorbia rigida	2		1		2				2	1	1	2	2	2	1	2	2	1		1	1		1																										
Securigera cretica											1	2		1	1																																	
Minuartia anatolica var. *anatolica*																1	1	2	1																													
Sherardia arvensis	1										1	1		1	1	1																																
Platanus orientalis																							4	4	4	3	3																						
Nerium oleander	2	1																					3	3	3	4	3																						
Muscari comosum	1	1	2																				1	1	1	1	1																						
Euphorbia peplus var. *peplus*																								1	1	1	1								1								1					
Geranium purpureum																							1	1		1	1							1			1							1				
Viola odorata																							1		1	1																						
Dracunculus vulgaris																								2		1	1																						
Hedera helix																							2	1	1																								
Myrtus communis subsp. *communis*	1																								2	2	1																						
Juncus acutus																									1		1																						
Mentha longifolia																							1	1																								
Plantago lanceolata																							1		1																								
Crataegus monogyna subsp. *monogyna*																										1	1																						
Micromeria graeca subsp. *graeca*																										1	1																						
Prunella vulgaris																										1	1																						
Campanula lyrata subsp. *lyrata*	1		1			2																	1	1			1																						
Pinus nigra subsp. *pallasiana*																												4	4	5	4	3																	
Vicia lathyroides									1	2																		1	2	2	1			1	1											1				
Origanum hypericifolium																															1	1																	
Lamium garganicum subsp. *striatum* var. *striatum*																												1	2																				
Galium peduliflorum																												2	1																				
Juniperus foetidissima																															2	2																1	
Clypeola jonthlaspi																																		1			1		2	1	1	1	1	1	1		2	1		
Aegilops triuncialis																																	1					1	1	1	1		1	1	1	1	1			1
Centaurea urvillei													2																				1	2	2		2	1	1	1	1	1	1		1				
Ornithogalum armeniacum				1																														1				1	1	1	1	1	2	1	1	1				
Papaver argemone																																					1	1	1	1		1	1	1		1				
Sedum album																																	1		2	1	1					1					1	1	1
Scandix iberica																																		1		1			3	1	1	1	3	3					

Running number / *Tekući broj*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Valantia hispida																																	1		1	1		1							1	1		1	1
Centaurea cadmea																																				3	3	3		1	2	1					1		
Anchusa hybrida																																						1	1			1	1	2		1				1
Sedum amplexicaule																																	1				1	1				1			1	1			1	
Moenchia mantica																																						1		1	1			1		1		1	1	
Buglossoides arvensis																														1			1	1		1	1		1				1	1	1	1	1		
Lamium amplexicaule																1																		1				1		1			1	1			1		1	1
Valerianella balansae											1								1														1	1	1	2	1	1	1			1	1						
Erodium cicutarium																																						1	1	1	1			1	1					
Neslia paniculata subsp. *thracica*																																		1	1	1			1				1		1				
Cyanus segetum																																	1	2	1		1		1							1			
Saxifraga tridactylites																																						1		1	1	1						1	1	
Others																																																		
Poa bulbosa		1	1	1		1	1	1	1			1		1		1	1					1				1	1	1	2	1	1	1		1	1		1	1	4	4	4			1	1	1	1	1	1
Trifolium stellatum var. *stellatum*	1	1	2						1	1	1	1	2	2		2	1		1					1			1			1			2	1	1	1	1	1	1	1	1	1	2	1	1	1	1		1
Quercus coccifera	1	1		2	2	2	2	3	2	2	3	4	4	4	3	3	4	4	4	4	4	4						1	1				4	5	4										3	3			
Anthemis cretica subsp. *albida*											1		2													1			2	1			1	2	2		1	1	2					2	1	1	3	2	2
Oryzopsis coerulescens	3	3	2	1	2				2	1	1	2		1	1	2	1			2	2				1																									
Crepis sancta																							1			1	1						1	1	1		1	1					1	1	1	1	1		1	1
Bromus hordeaceus subsp. *hordeaceus*									1	2						1	1			1						2								1	1		1			1				1	1	1	1	1	
Trifolium campestre	1	1	1			1	1	2	1					1					1		1					1	1						1			2													
Myosotis ramosissima				2			2			1																			1				1	1					1		1		1		1		1		
Scandix stellata											1	1	1	1		2	1																											1	1	1	1		1
Geranium lucidum									1	2	1	1	1		2		1					1			1			1																	1				
Bromus sterilis		1			1	2	2	1			1	2			1	2																													1			1	
Carex flacca subsp. *erythrostachys*				1	1	2		2	2	1					1			2	2		1	1																											
Alyssum smyrnaeum												1		2	1	1																								1				1	1	1	1	1	
Avena barbata subsp. *barbata*			1									1	2	1				1								1							1	1										1		2			
Silene odontopetala			1	1						1	2	1			2	1			1			1					1																	1		2	1			
Aubrieta deltoidea																												1	1				3	2							1				1	2	1		1
Galium album subsp. pycnotrichum											1							1	2				1																						1	2	1		1
Stachys cretica subsp. *smyrnaea*	2				1							1		2		1			1	1	1													1															
Torilis arvensis subsp. *neglecta*						1	1		1	2		1	2				1		1		1																													
Ranunculus marginatus																													2				1	1		1			1	1			1	1				1	
Ajuga chamaepitys																														1							1		1	1	1	1			2	1	1			
Leontodon tuberosus		1			2				1		1	1			1		1		1																															
Medicago minima var. *minima*												1	1	1		1						1																		1			1	1							
Milium pedicellare							1	1	1	1									2								1		1		1																			
Sanguisorba verrucosa		1	1		1						1		1	1			1		1																															
Valerianella muricata																				1		1								1			1											1	1		1	1		
Cynosurus echinatus		1				1	1	1	2	2																1		1																						
Legousia pentagonia										2			2	1																															1	1	1			1
Asparagus acutifolius													1		1	1	1	1					1	1																									
Alyssum fulvescens var. *fulvescens*																	2																						2	1		1	1	1				1			
Geranium molle		1	1								1			1		1																					1					1								
Bromus tectorum						2		1								1																					1	1		1	1								
Verbascum pinardii																														1					1	2	1					1	1		2				
Microthlaspi perfoliatum											1		2			1													1					1											1				

Running number / *Tekući broj*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Sisymbrium officinale											1	1																									1	1	1		2										
Cerastium glomeratum							1								1																				1	1													1	
Phleum exaratum subsp. *exaratum*														1																											1		1	1		1	1				
Trifolium boissieri											1		1		1																														1	1			1		
Trigonella velutina																															1				1							1	1	1		1				
Trifolium grandiflorum		1				2		1	1													1						1																					
Veronica cymbalaria				2					1	2	1																	1	1																					
Doronicum orientale				2		1	1	1																				3	2																					
Sedum pallidum			1										1							1	2																1													
Picnomon acarna	1																										1				1		1					1											
Cerastium brachypetalum subsp. *roeseri*			1																									1						1				1								1		
Teucrium polium																																												3	1		1	1	1
Cynodon dactylon				1	1								1	1								1																											
Tragopogon porrifolius subsp. *longirostris*									1												1																							1		2			1	
Medicago orbicularis	1										1		2		1									1																										
Minuartia thymifolia																																							1				1	1	1	1			
Lathyrus cicera		1									1																			1																			
Hypecoum pseudograndiflorum																																							1	1		1	2	1					
Cladanthus mixtus																																								1	1	1	1	1					
Holosteum umbellatum var. *umbellatum*																																							1					1		1	1	2
Crataegus monogyna var. *monogyna*	1	1			2																					1					1																
Micromeria myrtifolia			2		1															1		1																											
Arabis verna											2					1	2						1																											
Trifolium cherleri						1			1	1	1																																						
Ornithogalum cuspidatum																																		1					1			1	1						
Astragalus condensatus																														1										3	3	3							
Trifolium tomentosum								1						1	1							1																											
Senecio vulgaris																																							1		1		1	1					
Phlomis angustissima																																	1						5				5	4					
Helianthemum salicifolium																																					1	1	1	1									
Ziziphora tenuior																																			1	1		1				1						
Colchicum cilicicum																																							1			1					1	1
Veronica triphyllos																																							1	1		1	1					
Juniperus oxycedrus subsp. *oxycedrus*																														2					2										2	2		
Gagea graeca	1	1	1																						1																								

Other species: *Erysimum carium* 29: 3, 30: 3, 31: 3; *Clinopodium graveolens* subsp. *rotundifolium* 7: 2, 10: 1, 16: 1; *Alyssum desertorum* 27: 1, 29: 1, 32: 1; *Urospermum picroides* 1: 1, 3: 2, 7: 1; *Astragalus hirsutus* 47: 1, 45: 1, 46: 2; *Ornithopus compressus* 3: 1, 21: 1, 17: 1; *Capsella bursa-pastoris* 6: 1, 36: 2, 37: 1; *Clinopodium vulgare* subsp. *vulgare* 20: 1, 21: 1, 17: 1; *Eryngium campestre* 5: 1, 21: 1, 9: 1; *Thymus cilicicus* 26: 2, 28: 1, 30: 1; *Veronica pectinata* var. *pectinata* 5: 1, 28: 1, 30: 1; *Iris purpureobractea* 44: 1, 45: 1, 46: 1; *Cotoneaster nummularius* 44: 4, 45: 3, 46: 3; *Teucrium chamaedrys* 28: 1, 29: 1, 30: 1; *Origanum onites* 1: 3, 3: 1, 15: 1; *Scorzoneroides cichoriacea* 26: 1, 27: 1, 30: 1; *Acantholimon acerosum* 28: 1, 29: 1, 41: 1; *Galium spurium* subsp. *ibicinum* 26: 1, 27: 2, 28: 1; *Colchicum burtii* 32: 1, 36: 1, 37: 1; *Crataegus monogyna* subsp. *aronia* 6: 2, 10: 2, 11: 1; *Onobrychis aequidentata* 5: 1, 9: 1, 17: 1; *Brachypodium distachyon* 9: 1, 10: 1, 11: 1; *Geranium pyrenaicum* 44: 3, 45: 3, 46: 2; *Sanguisorba minor* subsp. *muricata* 49: 1, 50: 1, 25: 1; *Catapodium rigidum* subsp. *rigidum* var. *majus* 13: 1, 14: 1, 16: 1; *Bellis perennis* 21: 1, 17: 1, 49: 1; *Torilis nodosa* 38: 1, 42: 1, 43: 1; *Linum strictum* var. *strictum* 15: 1, 16: 1, 17: 1; *Anagallis arvensis* var. *caerulea* 3: 1, 19: 1, 49: 1; *Pilosella piloselloides* subsp. *magyarica* 8: 2, 9: 1; *Silene gallica* 21: 1, 24: 1; *Limodorum abortivum* 4: 1, 18: 1; *Lens nigricans* 41: 1, 42: 1; *Medicago littoralis* 31: 1, 32: 1; *Orobanche crenata* 1: 1, 3: 1; *Biscutella Didyma* 7: 2, 11: 1; *Tulipa cinnabarina* subsp. *toprakii* 44: 1, 45: 1; *Valerianella coronata* 8: 1, 10: 1; *Biserrula pelecinus* 14: 1, 16: 1; *Rhamnus oleoides* subsp. *graecus* 1: 2, 2: 1; *Sideritis albiflora* 1: 2, 3: 1; *Asphodelus aestivus* 1: 2, 3: 1; *Triticum aestivum* 36: 1, 43: 1; *Erica manipuliflora* 19: 3, 20: 1; *Crepis pulchra* subsp. *pulchra* 43: 1, 45: 1; *Trifolium phleoides* 13: 1, 17: 1; *Hypochaeris achyrophorus* 12: 2, 13: 1; *Rhagadiolus stellatus* 10: 1, 39: 1; *Asperula pseudoclorantha* 15: 2, 16: 2; *Stachys annua* 29: 1, 30: 1; *Rapistrum rugosum* 26: 1, 27: 1; *Ranunculus arvensis* 44: 1, 45: 1; *Teesdalia coronopifolia* 44: 1, 45: 1; *Taraxacum bessarabicum* subsp. *bessarabicum* 25: 1, 33: 1; *Thymus longicaulis* 41: 2, 43: 1; *Genista anatolica* 18: 2, 19: 2; *Sonchus asper* subsp. *glaucescens* 2: 1, 38: 1; *Lolium multiflorum* 16: 1, 17: 2; *Tripleurospermum parviflorum* 10: 1, 11: 2; *Medicago arabica* 11: 1, 39: 1; *Medicago coronata* 15: 1, 30: 1; *Trifolium leucanthum* 21: 1, 22: 1; *Lolium temulentum var. temulentum* 4: 2, 21: 1; *Crateagus azarolus* 18: 1, 21: 1; *Ophrys oestrifera* subsp. *oestrifera* 1: 1, 5: 1; *Hordeum murinum* subsp. *leporinum* 12: 1, 14: 1; *Polycarpon tetraphyllum* 49: 1; *Hypericum atomarium* 50: 1; *Serapias parviflora* 49: 1; *Oenanthe pimpinelloides* 50: 1; *Lactuca tuberosa* 50: 1; *Tetragonolobus requienii* 49: 1; *Milium vernale* subsp. *vernale* 23: 2; *Potentilla recta* 25: 2; *Ficus carica* 39: 2; *Sonchus oleraceus* 40: 1; *Anthemis pauciloba* var. *sieheana* 49: 1; *Carduus pycnocephalus* subsp. *albidus* 39: 1; *Blackstonia perfoliata* subsp. *serotina* 50: 1; *Rubus sanctus* 2: 1; *Rumex bucephalophorus* 3: 1; *Silene urvillei* 26: 2; *Dianthus zonatus* 3: 1; *Trigonella monspeliaca* 13: 1; *Verbascum bellum* 9: 2; *Geranium tuberosum* 32: 1; *Papaver rhoeas* 13: 1; *Helichrysum stoechas* subsp. *barrelieri* 3: 1; *Salvia fruticosa* 12: 2; *Plantago bellardii* 17: 1; *Raphanus raphanistrum* 6: 1; *Scorzonera sublanata* 14: 2; *Minuartia sclerantha* 41: 1; *Geranium robertianum* 43: 1; *Bromus diandrus* 41: 1; *Spergula arvensis* 41: 1; *Lamium garganicum* 42: 1; *Phlomis lycia* 5: 1; *Lathyrus sativus* 29: 1; *Ornithogalum sphaerocarpum* 22: 1; *Phillyrea latifolia* 14: 1; *Petrorhagia dubia* 17: 1; *Aristolochia incisa* 1: 1; *Cephalanthera rubra* 2: 1; *Galium floribundum* subsp. *floribundum* 17: 1; *Cyperus longus* 13: 1; *Alkanna tinctoria* subsp. *tinctoria* 1: 1; *Lotus angustissimus* 17: 1; *Velezia rigida* 13: 1; *Onosma frutescens* 16: 1; *Orobanche ramosa* 3: 1; *Hypochaeris glabra* 1: 1; *Ranunculus chius* 41: 1; *Rumex tuberosus* subsp. *tuberosus* 6: 2; *Gladiolus anatolicus* 1: 1; *Lens ervoides* 39: 1; *Crepis setosa* 40: 1; *Euphorbia peplus* var. *minima* 50: 1; *Astragalus spruneri* 41: 2; *Onopordum acanthium* 43: 2; *Poa pseudobulbosa* 38: 1; *Crepis micrantha* 50: 1; *Fritillaria carica* 41: 1; *Hordeum bulbosum* 40: 1; *Crocus fauseri* 46: 1; *Spergularia marina* 34: 2; *Physocaulis nodosus* 38: 1; *Cardamine graeca* 23: 1; *Lysimachia atropurpurea* 39: 1; *Anagallis arvensis* var. *arvensis* 49: 1; *Iberis carica* 41: 1; *Stipa bromoides* 49: 1; *Thymus longicaulis* subsp. *longicaulis* 44: 1; *Galium verum* subsp. *verum* 31: 1; *Trigonella coerulescens* 31: 1; *Gaudinia fragilis* 13: 1; *Erodium malacoides* 7: 1; *Plantago lagopus* 7: 1; *Teucrium scordium* subsp. *scordium* 5: 1; *Sarcopoterium spinosum* 1: 2; *Thapsia garganica* 8: 1; *Trifolium angustifolium* 17: 1; *Stellaria media* 41: 1; *Crepis reuteriana* 32: 1; *Alyssum hirsutum* 29: 1; *Galanthus gracilis* 27: 1; *Cerastium comatum* 42: 1; *Pisum sativum* subsp. *elatius* var. *elatius* 28: 1; *Fumana arabica* 1: 1; *Turgenia latifolia* 3: 1