

Distribution and conservation status of *Scutellaria rupestris* subsp. *cephalonica* (Rech.f.) Greuter & Burdet

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Ključne besede: Kefalonija, Jonski otoki, Kefalinija, Kefalenija, zdravilna zelišča, čeladnica.

Abstract

Scutellaria rupestris subsp. *cephalonica* (Rech.f.) Greuter & Burdet (Lamiaceae) is a perennial herb endemic to Mounts Ainos and Roudi on the island of Cephalonia. Until now, information about the taxon's distribution has been sketchy: two fairly localized populations on Mt. Ainos have been reported, one of them extinct, and two on Mt. Roudi, without specifics. Because we thought that the taxon is much more common, we designed a survey along contours encircling the two peaks totaling 80 km. We recorded 112 locations of the taxon. We found that *S. rupestris* subsp. *cephalonica* prefers sunny clearings within fir forest as well as crevices among limestone rock on somewhat flat terrain. On Mt. Roudi, the taxon grows above 800 m, and is rather uncommon. On Mt. Ainos, the taxon is quite common above 1100 m; below that altitude it has not been confirmed. The findings were more abundant on the NE slope of Mt. Ainos which is wetter and possibly cooler than the SW slope due to being shaded and more forested, less eroded, and with a deep organic layer. The main threat to the survival of the taxon is illegal grazing. The proposed Red List assessment according to IUCN is EN B1ab(iii)+2ab(iii).

Izvelek

Scutellaria rupestris subsp. *cephalonica* (Rech.f.) Greuter & Burdet (Lamiaceae) je trajnica, endemična za gori Ainos in Roudi na otoku Kefalonija. Do sedaj so bile informacije o območju razširjenosti taksona pomanjkljive: poročali so o dveh dokaj lokaliziranih populacijah na gori Ainos, od katerih je ena izumrla, in dveh na gori Roudi, vendar brez podrobnosti. Ker se nam je zdelo, da je takson veliko pogostejši, smo zasnovali raziskavo po plastnicah, ki obkrožajo dva vrhova, v skupni dolžini 80 km. Zabeležili smo 112 nahajališč taksona. Ugotovili smo, da *S. rupestris* subsp. *cephalonica* najraje raste na sončnih jasih v jelovem gozdu, pa tudi v razpokah med apnenčastimi skalami na uravnane terenu. Na gori Roudi takson raste nad 800 m in je precej redek. Na gori Ainos je takson precej pogost nad 1100 m; pod to višino njegovo uspevanje ni potrjeno. Najdbe so bile pogostejše na SV pobočju gore Ainos, ki je bolj vlažno in verjetno hladnejše od JZ pobočja, ker je bolj osenčeno in gozdnato, manj erodirano in z globoko organsko plastjo. Glavna nevarnost za preživetje taksona je nezakonita paša. Predlagana ocena Rdečega seznama po IUCN je EN B1ab(iii)+2ab(iii).

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Introduction

Scutellaria rupestris subsp. *cephalonica* (Rech.f.) Greuter & Burdet (Lamiaceae) is a perennial herb endemic to Mounts Ainos and Roudi on the island of Cephalonia, Greece. A vernacular generic name is skullcap.

Cephalonia (also spelled Kefalonia and Kefallinia) is the largest of the Ionian islands in W Greece with a surface area of 773 km². It is the third tallest Greek island (1628 m) following Crete and Euboea. Cephalonia sits on the continental shelf, with deep waters to the west. The bedrock consists of Mesozoic hard limestones and Tertiary deposits such as marls. The island is the product of tectonic upheaval, as evidenced by the continuing seismic activity to this day, a fact further attested to by marine fossils such as *Hippurites* sp. on the tallest peaks. The coastline is irregular with many bays, coves and promontories. The substantial altitudinal gradient, the fragmentation of the landscape, and the serrated coastline result in the development of distinct micro-environments that foster biodiversity. Further, Cephalonia has an interesting phytogeographical position with most floristic links with the opposite Greek mainland but also with Italy, the rest of the Balkan peninsula, and even N Africa (Gerakis et al., 2016; Polunin, 1987). Endemism is not as prevalent as in other insular environments, possibly because the Ionian islands were isolated from mainland Greece during the Pleistocene or even more recently. In fact, only 1% of plant species and subspecies are area or single island endemics, unlike what we observe, for example, in the Aegean Islands or Crete (Delforge, 1994; Panitsa & Iliadou, 2013).

In our experience, *Scutellaria rupestris* subsp. *cephalonica* grows at elevations of approximately 800–1600 m,



Figure 1. Photo of *Scutellaria rupestris* subsp. *cephalonica* within limestone crevice.

Slika 1. Fotografija taksona *Scutellaria rupestris* subsp. *cephalonica* v apnenčasti razpoki.

mostly in clearings of Greek fir (*Abies cephalonica*) forest as well as limestone rock crevices (Figure 1). Also in our experience, it begins to flower in early summer and continues to bear flowers and fruit till early fall. Although medicinal substances have been identified in other *Scutellaria rupestris* subspecies (Lazari et al., 2008; Skaltsa et al., 2011), the Cephalonian subspecies has not been evaluated with respect to its medicinal properties.

Classification and nomenclature

Historically, the classification of the genus *Scutellaria* has been complicated on account of its high phenotypic variability. According to Greuter & Raus (1984), the taxonomy of the *S. rubicunda* complex (to which the Cephalonian taxon belongs) is especially problematic. In an effort to put order to taxonomic disorder and simplify nomenclature, Greuter & Raus (1984) propose that the *S. rubicunda* complex is subdivided into five species: (i) *Scutellaria brevibracteata* Stapf (SW Asia, E Aegean), (ii) *S. rubicunda* Homem. (= *S. linneana* Caruel, Sicily), (iii) *S. rupestris* Boiss. & Heldr. (Albania and Greece), (iv) *S. sibthorpii* (Bentham) Halácsy (Cyprus), and (v) *S. sieberi* Bentham (Crete). Further, *S. rupestris* is subdivided into five subspecies: (i) subsp. *adenotricha* (Boiss. & Heldr.) Greuter & Burdet, (ii) subsp. *cephalonica* (Rech. fil.) Greuter & Burdet, (iii) subsp. *cytherea* (Rech. fil.) Greuter & Burdet, (iv) subsp. *geraniana* (Halácsy) Greuter & Burdet, and (v) subsp. *parnassica* (Boiss.) Greuter & Burdet.

From the taxonomic treatise of Greuter & Raus (1984), it follows that subspecies *cephalonica* is endemic to Cephalonia and taxonomically distinct from all other subspecies, evidently due to geographic isolation. There are no other taxa from the *S. rubicunda* complex reported from Cephalonia. The only other island endemic is recognized from Cythera (subsp. *cytherea*).

Like Greuter & Raus (1984), Bothmer (1987) considers the classification of the *S. rubicunda* complex in E Mediterranean particularly complicated and controversial on account of its variable morphology and because morphological similarities do not necessarily reflect genetic affinity; although Sicilian populations resemble those of Central Greece, they are not closely related. Therefore, Bothmer (1987) was motivated to conduct an extensive crossing experiment within the *S. rubicunda* complex, crossing parents from Greece and Sicily in order to further elucidate the genetic relationship between populations. The main hypothesis was that genetic affinity is reflected in how easily the different populations cross and whether the offspring are fertile.

Bothmer (1987) describes the Cephalonian population as follows: subsp. *cephalonica* (Bornm.) Greuter & Burdet.

Willd. 14: 308 (1984) ≡ *S. rupestris* β *cephalonica* Bornm., Feddes Rep. 25: 308 (1928) ≡ *S. rubicunda* subsp. *cephalonica* (Bornm.) Rech. fil., Bot. Archiv 43:28 (1941). – Type: Ins. Kephallonia, reg. abiet., ad rupes umbrosas, Bornmüller 1270 (B). Flowering time: mid June to mid July. Distribution and habitat: subsp. *cephalonica* is endemic on Mt Enos (Ainos) on Kefallinia at altitudes up to 1600 m. It grows in limestone rock crevices, scree, and in *Abies* forests. Further, he details the morphological characters distinguishing subsp. *cephalonica* from other species:

Growth habit and inflorescence. Four to five major shoots with few, long ± basal lateral branches. The short inflorescences are very lax, especially in the lower part.

Leaves and bracts. Very small (< 1.5 cm) narrowly triangular leaves and bracts with cuneate base and acute at apex. The margin is ± serrate with few large, blunt teeth.

Pubescence. Stem with sparse, ± appressed, short and a few longer, straight eglandular hairs, glandular hairs lacking; inflorescence with sparse, ± appressed, short and a few long, straight eglandular hairs mixed with rather large, glandular hairs.

Calyx and corolla. Very short corolla, especially the upper lip, from which the anthers are freely exposed. The basic color is pale rose on the upper lip and upper part of the tube. The base of the tube and lower lip are ± white and the lip, which is narrow and emarginate has distinct nerves, but no spots.

Based on the morphological characters and outcomes of crossing experiments, Bothmer (1987) proposes eight subspecies of *S. rupestris*: (i) subsp. *cytherea*, (ii) subsp. *adenotricha*, (iii) subsp. *caroli-henrici*, (iv) subsp. *rechingeri*, (v) subsp. *cephalonica*, (vi) subsp. *olympica*, (vii) subsp. *rupestris*, and (viii) subsp. *parmassica*. It is important to note that, although Bothmer (1987) further subdivides the species compared to Greuter & Raus (1984), the Cephalonian subspecies retains its status as a distinct, endemic taxon.

To further elucidate *Scutellaria* taxonomy, Bothmer (1991) continued the crossing program among populations from Greece and Sicily, this time broadening the parental genetic base. The conclusion most relevant to this paper is that, despite the relatively small morphological differences between subsp. *cephalonica* and the other subspecies, it is genetically the most differentiated subspecies as evidenced by the higher sterility barriers. This finding is especially striking in light of the low overall endemism of the Ionian Islands, as mentioned earlier. *Ajuga orientalis* L. subsp. *aenesia* (Heldr.) Phitos & Damboldt, *Limonium cephalonicum* Artelari, *Saponaria aenesia* Heldr., *Viola cephalonica* Bornm., and *Poa cephalonica* Scholtz. are the other endemics to Cephalonia (Panitsa & Iliadou, 2013). The uniqueness of *Scutellaria rupestris* subsp. *cephalonica* should be further investigated through molecular techniques.

Distribution

The most up-to-date reference with respect to the distribution of *S. rupestris* subsp. *cephalonica* has been the red data book of Greece (Phitos et al., 2009). In it, the authors (Niki Katsouni, Vasiliki Karagianni, and Dimitrios Phitos) report two fairly localized populations from Mt. Ainos, the larger of which occupies an area of just 570 m², while the smaller one has become extinct. Two more populations are reported from Mt. Roudi, at unspecified locations. Owing to the taxon's rarity and threats by human activity, the authors propose “Endangered” status according to IUCN (2023) criteria (EN B1abc+2abc; C1+2b).

The Phitos et al. (2009) report has been a surprise to us, as we frequently encounter sizable populations of *S. rupestris* subsp. *cephalonica* along casual hikes on Mounts Roudi and Ainos. Thus, we designed a systematic survey to answer the question of the distribution of *S. rupestris* subsp. *cephalonica*. We conducted the survey as part of the BIOCONSION project whose aims are (a) to map the distribution of *S. rupestris* subsp. *cephalonica*, (b) identify collected specimens, (c) identify metabolites of possible medicinal value, and (d) develop *in vitro* propagation techniques for the taxon. In this paper, we report on the first two objectives.

Methods

The survey was undertaken on Mounts Ainos (1628 m) and Roudi (1125 m), the *locus classicus* of the Greek fir (*Abies cephalonica*). The two peaks together comprise the Ainos National Park which is a NATURA 2000 site with code GR2220002 (<http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR2220002>, accessed 16 Sep. 2023).

The sampling design aimed for maximum efficiency, i.e., to record as many findings as possible with the finite amount of resources at our disposal. Therefore, the survey focused on the most promising biotopes according to the literature (Phitos et al., 2009) and preliminary field work along the altitudinal gradient to gauge the approximate range of the taxon. Phitos et al. (2009) report the taxon from altitudes 800–1600 m within stands of fir forest, open spaces of limestone rock or gravel, and along road banks. Our preliminary field work recorded findings from altitudes 836–1577 m. Considering that the vertical positional accuracy of a consumer-grade GPS within dense forest may be no better than 30 m, our findings fall within the range reported by Phitos et al. (2009).

The sampling transects were selected to coincide with contours at 200 m intervals around the two peaks. On Mt. Roudi, the 800 m contour crosses the core of the fir

forest, so it made sense to sample the 800 and the 1000 m contour, a total distance of 17.3 km. On Mt. Ainos, the fir forest starts at 800 m along the NE slope; elsewhere, it starts higher. Thus, we concentrated our effort at higher elevations and sampled along the 1100, 1300, and 1500 m contours, a total distance of 50.5 km. The survey was executed by a party of two surveyors walking in parallel paths, approximately 15 m apart, in order to cover as much ground as possible, all the while maintaining eye and voice contact. The survey took place from 19 Aug. to 20 Sep. 2021, a period that coincides with the onset of fruiting, when the taxon is easier to recognize.

In order to assign IUCN criteria for Red List assessment, it was necessary to count mature individuals. We counted as mature individuals flowering or seeding plants. Besides, the identification of the taxon based on vegetative parts is dubious, as it can be confused with other Lamiaceae species that grow in the area such as *Lamium garganicum* subsp. *striatum* (Sm.) Hayek.

Results

Field Survey

Table 1 shows the number of identified locations along each contour around each peak of the National Forest.

Occasionally, our course was interrupted by steep cliffs, especially along the SW slope of Mt. Ainos, where it was impossible to follow the contour without specialized equipment and training in mountaineering techniques. Such cliffs are depicted in Figures 2–4. In such cases, the surveying party deviated higher or lower from the true course until the obstacle was surpassed.



Figure 2. Rugged terrain on the SW slope of Mt. Ainos. The 1500 m transect passes through approximately the middle of the photo.
Slika 2. Razgiban teren na JZ pobočju gore Ainos. Transekt na 1500 m poteka približno na sredini fotografije.



Figure 3. Rugged terrain on the SW slope of Mt. Ainos. The 1300 m transect passes through approximately the middle of the photo.

Slika 3. Razgiban teren na JZ pobočju gore Ainos. Transekt na 1300 m poteka približno na sredini fotografije.



Figure 4. Rugged terrain on the SW slope of Mt. Ainos. The 1100 m transect passes through approximately the middle of the photo.

Slika 4. Razgiban teren na JZ pobočju gore Ainos. Transekt na 1100 m poteka približno na sredini fotografije.

Table 1. Detailed tallies of locations of *Scutellaria rupestris* subsp. *cephalonica*.

Tabela 1. Razdelani seštevki nahajališč taksona *Scutellaria rupestris* subsp. *cephalonica*.

| Contour (m) | Mountain Peak | |
|-------------|---------------|-------|
| | Roudi | Ainos |
| 800 | 0 | |
| 1000 | 2 | |
| 1100 | | 21 |
| 1300 | | 38 |
| 1500 | | 31 |

The final tally of distance hiked along the transects was 80.0 km, i.e., 12.2 km longer than planned. This is because on account of the rough terrain, it was not al-

ways possible to follow the exact contour. The distance hiked excludes the vertical hike from the parked vehicle to where the survey left off the previous day or the hike back to the parked vehicle at the end of the day. In Figure 5, we map the distribution of the 92 locations of *Scutellaria* that we recorded along the surveyed transects plus the 20 locations that we recorded during preliminary scouting. In Figure 6, we show the theoretical contours compared to the actual path hiked.

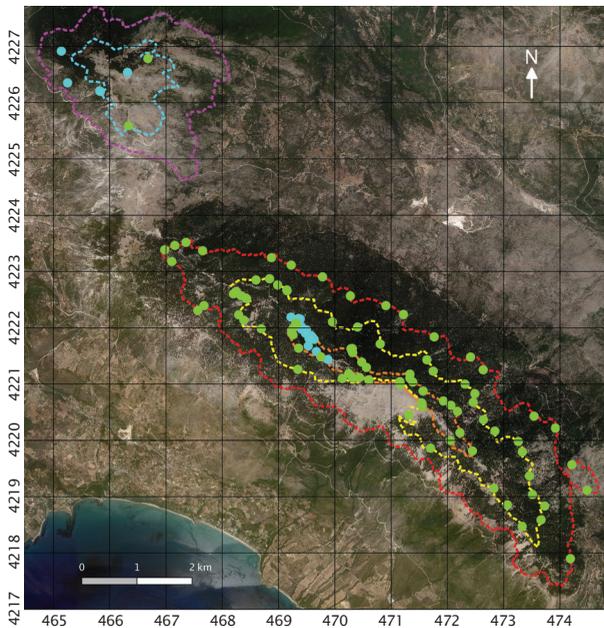


Figure 5. Map of locations of *Scutellaria rupestris* subsp. *cephalonica* along the transects. The contours on Mt. Roudi are represented in violet (800 m) and cyan colors (1000 m). The contours on Mt. Ainos are represented by red (1100 m), yellow (1300 m), and orange colors (1500 m). The locations from 2021 are represented by green dots, earlier locations by blue dots.

Slika 5. Zemljevid nahajališč taksona *Scutellaria rupestris* subsp. *cephalonica* vzdolž transektov. Plastnice na gori Roudi so predstavljene v vijolični (800 m) in sinji barvi (1000 m). Plastnice na gori Ainos so predstavljene z rdečo (1100 m), rumeno (1300 m) in oranžno barvo (1500 m). Nahajališča iz leta 2021 so predstavljene z zelenimi pikami, starejša nahajališča pa z modrimi pikami.

The total length of transects surveyed was 80 km. Assuming that each surveyor visually scans a width of 2 m on either side of his path, the two surveyors sampled an area of $80 \text{ km} \times 4 \text{ m} \times 2 \text{ persons} = 0.64 \text{ km}^2$ in which 92 locations were identified. We calculate the Extent of Occurrence (EOO) of the taxon as 24.69 km^2 ; this is a minimum; the upper limit according to Phitos et al. (2009) would be the area encircled by the 800 m contour, 39.56 km^2 (Figure 7). We further counted as mature individuals only flowering or seeding plants, disregarding non-mature plants or robust plants (seemingly mature) that had been grazed, and therefore didn't flower or bear fruit. The total number of mature individuals that

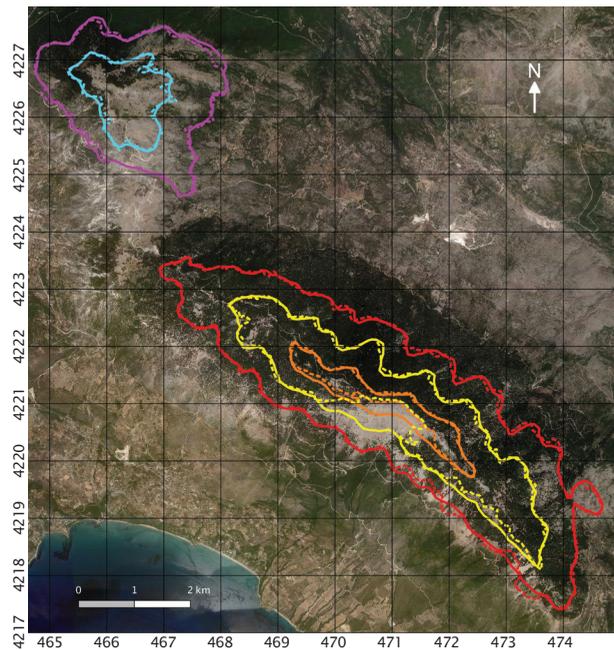


Figure 6. Comparison of theoretical contours (solid lines) to the actual transects hiked (dashed lines).

Slika 6. Primerjava teoretičnih plastnic (polne črte) in dejansko prehojenih transektov (črtkane črte).

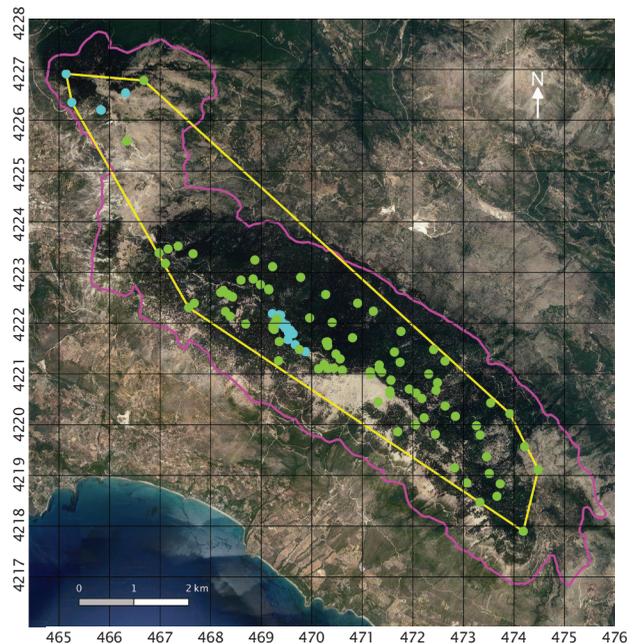


Figure 7. Locations from the 2021 survey are represented by green dots; locations from our preliminary field research are represented by blue dots. The yellow polygon is the Extent of Occurrence of 24.69 km^2 , based on our findings; the magenta polygon is the 800 m contour.

Slika 7. Nahajališča iz raziskave leta 2021 so predstavljene z zelenimi pikami; nahajališča iz naših preliminarnih terenskih raziskav so predstavljene z modrimi pikami. Rumeni poligon prikazuje obseg pojavljanja v velikosti $24,69 \text{ km}^2$ in temelji na naših ugotovitvah; magenta poligon je plastnica na 800 m.

we counted is 755; this is a minimum, as there wasn't time to perform an exhaustive tally of mature individuals at each location. Extrapolating from the sampled area of 0.64 km² to the EOO of 24.69 km² yields a minimum estimate of more than 29,000 mature individuals. It is easy to see that the assignment of category Endangered based on criterion C is not warranted.

Identification

We collected herbarium specimens that are kept at the Laboratory of Soil Science at the Ionian University. We compared our findings to detailed descriptions, drawings, and photos by Bothmer (1987) as well as the digitized type specimen of *Scutellaria rupestris* subsp. *cephalonica* (sub *Scutellaria rubicunda* subsp. *cephalonica*) located in the herbarium of the University of Zurich (Nyffeler and Guggisberg, 2023). The type specimen in itself could not be depended on for accurate identification, because it was collected on 17 May, i.e., before flowering. The comparison of our findings with the description by Bothmer (1987) and the type specimen assures us of positive identification. We did not notice morphological deviations from the published description(s). Besides, there is no other taxon of the *S. rubicunda* complex reported from Cephalaria.

Discussion

For the first time we mapped the distribution of *Scutellaria rupestris* subsp. *cephalonica*. The surveyed path approximately followed predefined contours spaced at 200 m intervals around Mounts Roudi and Ainos. Slight deviations from the contours resulted from technical limitations of consumer-grade GPS receivers. According to Phitos et al. (2009), the distribution of *S. rupestris* subsp. *cephalonica* is sparse; specifically, they mention only four populations on Mounts Roudi and Ainos, of which one was presumed extinct. Our survey reveals a different picture. On Mt. Roudi, the taxon grows above 800 m, and is indeed rather uncommon. On Mt. Ainos, however, the taxon is quite common, at an altitude of 1100 m and above, mostly on the NE slope which is wetter and possibly cooler due to being shaded and more forested. The forest cover slows erosion and forest litter promotes the formation of a layer of organic material and moss where *Scutellaria* thrives. *Scutellaria* was also found in crevices of limestone rock near the summit where the ground levels off and some soil is retained within the crevices. *Scutellaria* was not found on bare, eroded slopes covered with loose scree.

The precipitation map (Figure 8) shows that the NE slope of Ainos receives more rain than the SW slope. We would like to note that the summer of 2021 was exceptionally hot and dry, conditions that prevailed well into

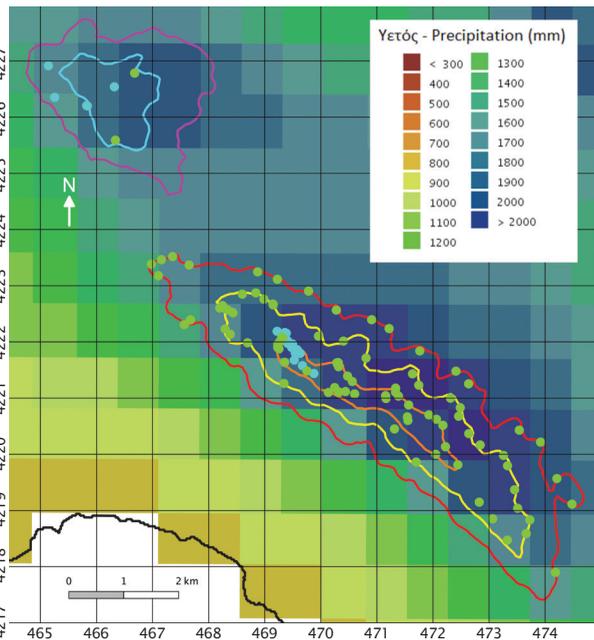


Figure 8. Precipitation map of the study area. The NE slope of Ainos is wetter than the SW slope, hence more forested and less eroded (Hellenic National Meteorological Service, 2023).

Slika 8. Zemljevid padavin raziskanega območja. SV pobočje Ainos je bolj vlažno kot JZ pobočje, zato je bolj gozdnato in manj erodirano (Hellenic National Meteorological Service, 2023).

the fall. As a result, the differences in vegetative vigor between the two slopes were possibly more pronounced as opposed to an average summer.

According to Phitos et al. (2009), *S. rupestris* subsp. *cephalonica* grows within stands of fir forest. To be precise, we found that the taxon rarely thrives in deep shade; it prefers sunny clearings among fir stands where forest litter creates a deep layer of organic, moss-covered soil (Figure 9). *Scutellaria* was not found on barren, steep scree.



Figure 9. The typical biotope of *Scutellaria rupestris* subsp. *cephalonica* consists of sunny clearings among fir stands.

Slika 9. Značilen biotop taksona *Scutellaria rupestris* subsp. *cephalonica* sestavljajo sončne jase med sestoji jelke.

The extent of the ancient fir forest has severely shrunk during the last few centuries. Although illicit logging declined during the 20th century due to the switch to alternative fuels for heating, the forest has never reclaimed its former extent. Uncontrolled, illegal grazing by unattended goats (and occasionally sheep) is the main threat to the survival of the forest, and by extension to the survival of *Scutellaria* (Figure 10). Although the plant itself may escape grazing due to its prostrate growth habit, the forest around it gradually disappears. Follner et al. (1999) show how the age structure and the ability of the forest to regenerate itself have been compromised by illegal grazing.



Figure 10. Uncontrolled, illegal grazing by unattended goats at the core of Ainos National Forest.
Slika 10. Nenadzorovana in nezakonita prosta paša koz v jedru Narodnega Parka Ainos.

The other threat is fire, whether accidental or intentional. Shepherds routinely burn brush vegetation at the foothills of the mountains to clear land for grazing. It is conceivable that a runaway wildfire spreads into the fir forest. This will diminish the extent of the forest which is the natural habitat of *Scutellaria* and takes years to restore. Greek fir forest is slow to regenerate because (a) it is not fire-resilient; the cones along with the enclosed immature seeds are usually destroyed during a fire, (b) fir trees develop slowly, reaching reproductive maturity at ca 30 yr, and maximum seed production at 60–100 yr, and (c) seedlings rarely survive in the open, far from mature tree stands (Daskalidou et al., 2019). And, although *Scutellaria* rarely thrives in deep shade, it looks like it needs the thick, organic forest soil to grow its expansive root system that enables it to reproduce during the dry season. It is remarkable that when *S. rupestris* subsp. *cephalonica* is taken out of its natural context, it becomes a very robust plant. Specimens raised *in vitro* from wild seed and transplanted to the local botanical garden near sea level grow stems longer than 30 cm and leaves several times larger than in its natural state (Figure 11). We postulate either that the warm climate of the botanical garden is conducive to growth, or that, in the wild, plants are grazed before they reach maximum size.

Phitos et al. (2009) assigned *Scutellaria rupestris* subsp. *cephalonica* the IUCN category Endangered, EN B1abc+2abc; C1+2b. This notation by current standards is incomplete and therefore cannot be fully evaluated. Specifically, according to present standards, conditions b and c that accompany criterion B must be followed by lower case roman numerals in parenthesis (i–v). This is not the case. In addition, we do not see evidence for condition c, “Extreme fluctuations in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals.” In regards to the application of criterion C, the Endangered category assumes a number of mature individuals <2500. Based on the results, where we estimate that more than 29,000 individuals exist on the surveyed mountains, the application of criterion C is not warranted.

To apply criterion B, we further assume that the number of “locations” is two. According to Red List criteria, “location” refers to a threat-based area, and is very different from the general notions of location and locality: The term “location” defines a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present. Where a taxon is affected by more than one threatening event, location should be defined by considering the most serious plausible threat. In the case of Ainos National Forest, the single most threatening event that can rapidly affect all individuals of the taxon present would be a wildfire. However, a wildfire would likely jeopardize the *Scutellaria* population from Mt. Ainos or Mt. Roudi but not both, as there is an extensive treeless zone between the two mountains. In light of the new data, we propose a Red List assessment of Endangered EN B1ab(iii)+2ab(iii).



Figure 11. Specimens of *Scutellaria rupestris* subsp. *cephalonica* raised *in vitro* from wild seed and transplanted to the local botanical garden are more robust than in their natural habitat.
Slika 11. Primerki taksona *Scutellaria rupestris* subsp. *cephalonica*, vzgojenih *in vitro* iz semen, nabranih v naravi in presajenih v lokalni botanični vrt, so robustnejši kot v svojem naravnem habitatu.

Conclusions and Recommendations

This was the first attempt to map the distribution of *Scutellaria rupestris* subsp. *cephalonica*. Contrary to earlier reports, it seems that the taxon is quite common within its range, especially on Mt. Ainos. The findings were more abundant on the NE slope of Mt. Ainos which is wetter and possibly cooler than the SW slope due to being shaded and more forested, less eroded and with a deep organic layer. The proposed Red List assessment is Endangered EN B1ab(iii)+2ab(iii).

In the future, the knowledge of the distribution of the taxon can be further studied. On Mt. Roudi, it seems that we exhausted the entire distribution range. On Mt. Ainos, the survey could be further expanded to altitudes lower than 1100 m. Of course, the expense of the survey increases per unit of elevation drop, as the length of the contour increases. For example, surveying the 900 m contour around Mt. Ainos would add 29 km or 36% to the total distance walked during the present survey.

In order to monitor population size in the future, one could delimit smaller areas with sizeable clusters of the taxon, in the order of 100–500 m², and monitor these clusters in the long term, at least 10 years according to IUCN guidelines. Enough replications randomly scattered throughout the Extent of Occurrence observed for long enough would generate a chronosequence of data that could yield reliable estimates on the effect of management or lack thereof on *Scutellaria* populations.

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