

Ecology and distribution of *Uromenus dyrrhachiacus* (Karny, 1918) (Orthoptera: Tettigoniidae)

Écologie et répartition de Uromenus dyrrhachiacus (Karny, 1918) (Orthoptera : Tettigoniidae)

Michèle LEMONNIER-DARCEMONT^{1,*}, Gerta SUBASHAJ², Eltjon HALIMI³,
Christian DARCEMONT¹, Philippe PONEL⁴

1. Groupement d'études entomologiques Méditerranée (GEEM), PO Box 60, 48060 Parga, Greece

2. Faculty of Medical Technical Sciences, Reald University College, Vlora, Albania

3. Universiteti Tiranës, Fakulteti Shkencave Natyrore, Tirana, Albania

4. Institut méditerranéen de biodiversité et d'écologie marine et continentale (IMBE), Aix-Marseille Université, Avignon Université, CNRS, IRD, Technopôle Arbois-Méditerranée, Bât. Villemin, BP 80, F-13545 Aix-en-Provence Cedex 04, France

* Corresponding author: michele.lemonnier-darcemont@geem.org

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Abstract

Uromenus dyrrhachiacus, called Albanian Saddle Bush-cricket, is a critically endangered species that is highly localised in the Durrës region of Albania (Chobanov et al. 2016). The aim of the study, which was carried out in 2022 and 2023, was to know its exact distribution and ecological requirements, preliminary information needed for any future conservation actions. After field sampling and a preparatory phase of the study in 2022, an intensive field survey was carried out in 2023 in the presumed and historical distribution area, but also in neighbouring regions with certain similarities. Many parameters were recorded, such as relative abundance, geological structure, dominant plants, location and distance from the sea, state of pastoralism, state of environmental degradation, etc., for the stations where the species was found as well as for the stations where the taxa was not observed. It is concluded that the species under consideration, which occurs on siliceous soils, was originally dependent on matorral-type plant formations of sclerophyllous forest with *Quercus ilex* L., in close proximity to the sea. For generations, man has altered the habitat of this region with plantations, changes in pastoral practices

and, more recently, severe habitat alteration for industrial needs, urban expansion and tourist development. The species is now found only in more or less disturbed and degraded environments, which are not indicators of its ideal habitat. This must be taken into account when discussing the protection of its habitat or the implementation of mitigation measures for projects that further reduce its range.

Résumé

Uromenus dyrrhachiacus est une espèce en danger critique d'extinction, très localisée dans la région de Durrës en Albanie. L'objectif de l'étude, menée en 2022 et 2023, était de connaître précisément sa répartition mais également ses exigences écologiques, informations préalables requises pour toute action de conservation future. Après un échantillonnage sur le terrain et une phase préparatoire de l'étude en 2022, une recherche intensive sur le terrain a été effectuée en 2023 sur l'aire de répartition supposée et historique mais aussi sur des régions voisines présentant certaines similarités. De nombreux paramètres ont été notés, tels que l'abondance relative, la

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structure géologique, les plantes dominantes, la localisation et la distance à la mer, l'état du pastoralisme, l'état de dégradation du milieu, etc., pour les stations où l'espèce a été trouvée ainsi que les stations où elle n'a pas été observée. Nous en concluons que l'espèce, présente sur sol siliceux, était à l'origine inféodée aux formations végétales de type matorral issues de la forêt sclérophylle à Quercus ilex L., à proximité de la mer. Depuis des générations, l'homme a remanié l'habitat de cette région avec notamment des plantations, des pratiques pastorales qui ont évolué et plus récemment des altérations sévères des habitats pour des besoins industriels, d'extension de la ville et de développement touristique. L'espèce ne se trouve aujourd'hui plus que sur des milieux plus ou moins remaniés et dégradés qui ne correspondent pas à son habitat originel probable. Ceci est à prendre en considération pour toute discussion relative à la protection de son habitat ou à la mise en place de mesures compensatoires à des projets venant davantage réduire son aire de répartition.

Introduction

Uromenus dyrrhachiacus was discovered by Karny (1918) near the city of Durrës in central Albania. At that time, the author defined three main areas on the coastal hills from south to north (current names in parenthesis): Shkâmbe (Shkëmbi i Kavajës), Mali Durcit (Mali i Durrësit) and Porte (Portez).

This *Uromenus* species belongs to the *rugosicollis* group, the majority of those taxa live in North Africa. *U. elegans* (Fischer, 1853) is the only other *Uromenus* found in the Balkans, more precisely in southern Greece: in the Peloponnese and in Crete. It is also known from Sardinia and the western part of the Italian peninsula.

After the Karny's discovery, there was no specific mention of new observations in the literature for more than half a century. In 1996 (Fontana & Kleukers, pers. comm.), it was reported again in a bushy plant formation above the sea, west of the commercial harbour, and more recently in 2015 (Puskás & Szövényi in Heller *et al.* 2021), further north, but still within the area given by Karny in 1918. In 2022, these last two sites were destroyed. The first probably by landslides related to urbanisation above and which destroyed the original biotopes, the second by bulldozers levelling the hill to make way for a new industrial port terminal.

In order to improve our knowledge (distribution, ecology) of this species with the aim

of proposing conservation measures, we decided to carry out a study in 2022 and 2023. The aim is to share with stakeholders a better vision of the situation, the threats and how to mitigate them.

In the summer of 2022, a first prospecting campaign in the field and indoor breeding were set up (Lemonnier-Darcemont *et al.* 2022). In 2023, a more extensive field campaign was carried out with the aim of understanding the relationship between its presence/absence, and its abundance if any, and the habitat characteristics of each surveyed site.

The elective habitat of this insect is located in the coastal region of Durrës, included in the Peri-Adriatic depression. The plant formations located between 15 and 100m above sea level, consist of a rather sparse herbaceous vegetation, with a predominance of woody or woody-based plants.

In the field, the first adults are found in June with a peak in early July. According to Karny (1918), some individuals can survive until at least mid-September.

In 2015, the species was listed as Critically Endangered (CR), on the IUCN Red List of Threatened Species (Chobanov *et al.* 2016).

Methods

The taxonomic references used are respectively (Cigliano *et al.* 2025) for Orthoptera and (POWO 2025) for plants.

The first survey in the summer of 2022 was designed to get an initial idea of the status of the species and its ecological requirements (Lemonnier-Darcemont *et al.* 2022) and to refine the methodology for the second year. In the majority of cases, *U. dyrrhachiacus* was found at a height of at least 50cm in the vegetation, mostly woody or woody-based. In these stations, the cover of plants over 50cm represents on average more than 50%, the rest being composed of very low woody and herbaceous plants (< 50cm). The structure of the vegetation is an important element in the ecological requirements of this insect since it needs the stems of *Spartium junceum* L., *Phragmites* sp., *Cichorium* sp., *Foeniculum vulgare* Mill., both to reproduce and to lay eggs, and feeds readily on the parenchyma of young stems of *S. junceum*, *F. vulgare* and their leaves, or on the flowers of *V. agnus-castus* L. for example. The type of the soil is also important to be noted.

Study site

The study area is located in the area of Durrës, Albania, mainly in the historical known distribution of the species, but also extended to the nearest capes, to the north and to the south. The study area is shown in Figure 1.

Figure 2 shows the geological nature of the studied area extracted from <https://geoportal.asig.gov.al/map/?auto=true>.

This area is made up of:

- Qh is composed of clays, silts and peats, is mainly siliceous. These are mainly lagoon or estuarine deposits associated with sea level variations during the Holocene;
- Qp-h consists of sands, gravels, and silts, deposited by rivers and gravitational processes from the nearby Alpine mountains. The Durrës alluvial-proluvial formation is generally calcareous, although siliceous materials may be present locally, especially in gravitational sediments;
- N2-2rr consists of sandstones and conglomerates, indicating a fluvial to deltaic environment under tectonic influence. It is mainly calcareous although locally siliceous elements may be present;
- N2-1h is associated with more recent marine or lacustrine environments. Soils are of sedimentary origin, mainly siliceous, rich in sandstone and clay, with the presence of siltstone;
- N1-3m is associated with the marine events of that time. The soils are of sedimentary origin, mainly siliceous, rich in sandstone and clay, with the presence of evaporites;
- N1-2s is mainly calcareous. It may contain siliceous inclusions, but calcium carbonate dominates.

This region is subject to a Mediterranean climate with mild, wet winters and hot, dry summers, with certain microclimates accentuated by the influence of the Adriatic Sea.

The species is located exclusively in the meso-Mediterranean vegetation belt (Quézel & Médail 2003). Its elective biotopes are located between 10m and 100m altitude, close to the sea (≤ 1 km). These are matorral-type plant formations originating from the sclerophyllous forest of *Quercus ilex*, more or less degraded and disturbed, as shown by the dominance in most of the sites of plants well adapted to these environments: *Dittrichia viscosa* L., *Scolymus hispanicus* L., *Onopordum* sp., *Eryngium* sp., *Cichorium* sp., *Asphodelus* sp.,



Figure 1 – Map of the study area. The red ellipse covers the historical localities and the green ellipse encompasses the study area.

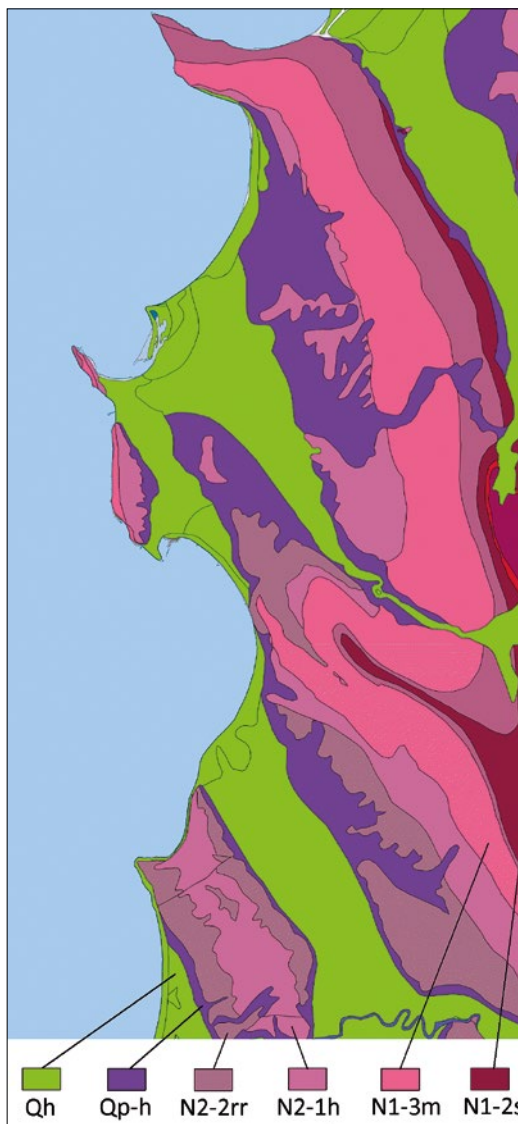


Figure 2 – Geology of the area. Qh = Quaternary Holocene swamp-lacustrine formation, Qp-h = Quaternary formation (Pleistocene and mainly Holocene), N2-2rr = Middle Pliocene (Neogene) formation (Rrogzhina) associated with the erosion of the Alpine mountains and variations in sea level, N2-1h = Helmesi Formation of the Lower Pliocene (Neogene) age, N1-3m: Messinian Formation of the Upper Miocene (Neogene) age, N1-2s = Neogene formation that covers the lower to middle Miocene.

Foeniculum vulgare, and *Spartium junceum*. For each surveyed site, the main plants taller than 50cm are reported.

A global view of the structure of the vegetation is also recorded, in most cases using a drone, a dji Mavic Pro with a 1/2.3" 12 Mpix, 26mm CMOS camera (78.8° angle of view).

Sampling

The main challenge was to target suitable sites in order to optimise our research time and answer as many questions as possible about the current status of the species. For this purpose, a precise preparation was necessary, using satellite maps (Google Earth®) to locate potentially suitable habitats and also open topographic maps to optimise our access time to the selected localities. In addition, adjustments were made after direct observation of the soils, the composition of the plant structure, and in some cases, the modification by human activities. All the targeted localities were studied, except for private and military areas. The setback concerns only the access to the military area of the Portez cape, which was not allowed.

At each site, sampling without collection was carried out by one or more observers following random transects without overlap. Specimens were adult or subadult, easily distinguished by the colour of the head near the pronotum (blue for adults and black for subadults) and by more discernible tegmina for adults (Figure 3).

U. dyrrhachiacus is found at a height of at least 40cm in the vegetation and is therefore relatively easy to find. In order to compare

the relative abundance of the species between sites, we normalised the measurements by providing: number of individuals seen per 30 minutes and per observer. In this way, the results can be compared regardless of the time elapsed and the number of observers involved.

Data analysis

Statistical analysis was carried out using Excel and XLStats. The aim of the statistical analysis was to identify which of the variables recorded at each site could provide enough significant information to be considered as valid covariates for predicting the relative abundance of the species. This could inform future advice on the management of the species' habitats and mitigation plans in the eventuality of future threats.

Results

The results including all the variables recorded are shown in Table 1.

The presence is also shown on a map in Figure 4.

The EOO (IUCN 2012) is about 35km² and gives an idea of its former range, at least before the city expanded many decades ago. The historical and current sites of *Uromenus dyrrhachiacus* belong to only two geological formations dated to the Neogene, i.e., ≤ 10 millions years ago: N1-3m and N2-1h.

The distribution of the species is divided into three distinct subpopulations:

- the main subpopulation is located on both sides of the chain of hills located north of Durrës. The distribution area is small but the species can be locally abundant in some spots, especially in the middle near a pass (Spitallë). The threat is the destruction of the hills (soil collected and displaced by a noria of trucks) currently in the northern part, near the new port, and in the southern part, near the city;
- the subpopulation of Portez, in the north of the new port is isolated and could disappear (work also on the ground of this area) if it is absent of the military area;
- a subpopulation in the south of Durrës still exists but in a very restricted area. This population is threatened with extinction due to the urbanisation of the area.



Figure 3 – *Uromenus dyrrhachiacus* male (left) and female (right), adult (up) and sub-adult (down).

These three areas match with the three areas mentioned by Karny in 1918. The Figure 5 shows the biotopes of these three distinct areas. Now the area between the three subpopulations has been definitively urbanised or destroyed and is no longer suitable for the species.

The species is absent from the other capes, in the north and in the south of Durrës, despite some similarities in the biotope (type of soil, composition of plants). Between these areas, the entire coastline has been used and modified by human activities for construction and tourism.

Of the 21 other variables analysed, including 15 plants and 4 parameters of vegetation structure, the data analysis aimed to exclude variables that did not provide significant information to predict the presence of *Uromenus dyrrhachiacus*. We reduced the selected variables as long as at least 85% of the variability in relative abundance could be predicted by these selected variables. The fewer variables we keep, the easier it is to communicate conservation actions to stakeholders and to conduct mitigation studies. As a result, 6 of them (5 plants and the structure in mosaic) can be used as covariates (Figure 6): 5 plants (presence/absence) and the heterogeneous mosaic structure (yes/partial/no), if the site belongs to one of the two geological formations mentioned above.

The presence of *Foeniculum vulgare*, *Phragmites* sp., *Onopordum* sp. and *Eryngium* sp. positively predicts the presence and the abundance of the species. Conversely, the presence of *Cichorium* sp. has a negative effect on the prediction. The latter indicates a habitat that is too dry. At the inverse, if *Phragmites* sp. is too abundant and dense, the habitat is not suitable for *Uromenus*. With regard to the structure of the vegetation, the most important point is the mosaic of heterogeneous structure whatever the relative proportions of each category (close dense vegetation, plants higher than 50cm, others: herbs, bare soils, etc.) are within a normal distribution around their mean. The other plants are not significant as predictors, either because they are ubiquitous, regardless of the presence or absence of *Uromenus*, such as *Spartium junceum* and *Scolymus hispanicus*, or because they do not play a role in the suitability of the habitat for the species, such as *Pistacia lentiscus* L., *Centaurea calcitrapa* L., etc. *Rubus* sp. has a positive or a negative effect depending on its

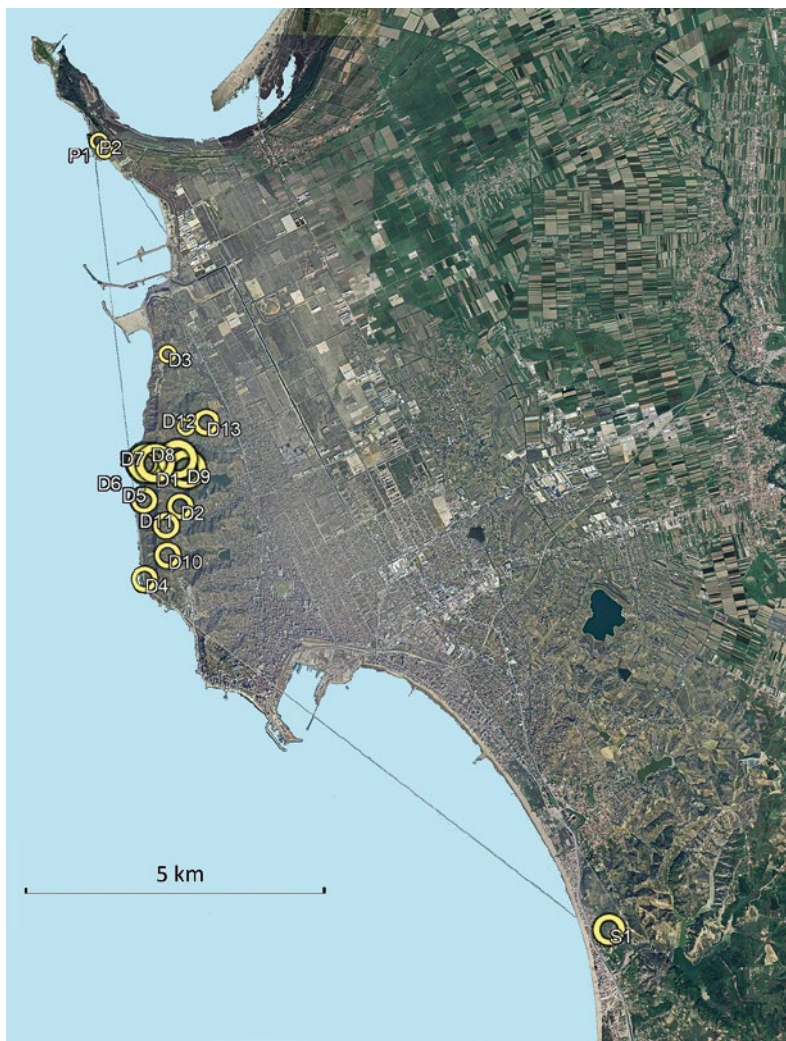


Figure 4 – Map of localities of presence and outline (grey lines) of extent of occurrence (EOO). The size of the circles reflects the relative abundance of the species.



Figure 5 – Biotopes of the 3 distinct areas. Left up: Northern area (Portez), right up: Southern area (Shkëmbi i Kavajës), down: central area composed of hills located on the north of Durrës, left: west side (sea side), right: east side.

Table 1 – All sites studied

Locality	Abundance Number of records (adults and subadults) per 30m per observer	Location				Geology	Dominant plants (> 50 cm)														Structure of vegetation								
		Latitude	Longitude	Altitude (m)	Distance from the sea (m)		Spartium junceum	Scolymus hispanicus	Foeniculum vulgare	Vitex agnus-castus	Cichorium sp.	Phragmites sp.	Onopordum sp.	Eryngium sp.	Pteridium aquilinum	Dittrichia viscosa	Pistacia lentiscus	Asphodelus sp.	Rubus sp.	Quercus ilex	Centaurea calcitrapa	Heterogenous in mosaic Yes/ Partially /No	% of closed dense vegetation	% of plants > 50 cm height	Other (herbs, soil, etc.)				
Species present																													
P1	8	41.395440	19.408277	21	150	N1-3m	X	X	X	X			X													P	30	60	10
P2	9	41.396744	19.406976	15	177	N1-3m	X	X	X	X	X			X												P	25	70	5
D1	38	41.345151	19.422848	115	356	N1-3m	X	X	X				X		X											Y	20	60	20
D2	14	41.338587	19.428253	66	725	N2-1h	X	X				X		X												P	10	60	30
D3	8	41.362841	19.423875	48	271	N2-1h	X	X				X	X				X		X							Y	5	45	50
D4	14	41.326977	19.421057	15	60	N1-3m	X	X	X			X						X								P	10	80	10
D5	18	41.339431	19.420208	20	92	N1-3m	X	X	X			X						X								Y	10	70	20
D6	30	41.345143	19.420150	35	102	N1-3m	X	X	X			X														Y	20	65	15
D7	34	41.345198	19.420680	50	143	N1-3m	X	X	X			X														Y	10	65	25
D8	45	41.345934	19.427265	70	690	N2-1h	X	X	X			X	X		X											Y	20	65	15
D9	36	41.344430	19.429000	45	815	N2-1h	X	X	X			X	X	X				X								Y	25	60	15
D10	15	41.330797	19.426234	106	537	N2-1h	X	X						X				X	X	X						Y	15	75	10
D11	15	41.335435	19.425659	108	525	N2-1h	X	X						X												P	35	60	5
D12	9	41.351373	19.428448	45	760	N2-1h	X	X				X			X											Y	20	45	35
D13	13	41.352031	19.432800	53	1125	N2-1h	X	X				X	X													Y	20	55	25
S1	22	41.274358	19.521113	67	485	N1-3m	X	X	X			X	X		X				X							Y	30	40	30
Species not observed																													
R1	0	41.573457	19.479380	22	98	N2-2rr	X	X											X							N	50	10	40
R2	0	41.580897	19.454607	16	290	N2-2rr	X												X		X					N	30	20	60
D14	0	41.360884	19.428886	30	720	N2-1h	X	X	X									X								N	20	60	20
D15	0	41.354171	19.423724	85	330	N2-1h									X											N	70	20	10
D16	0	41.335375	19.420046	19	64	N1-3m							X													N	80	10	10
D17	0	41.334124	19.425149	126	488	N2-1h	X	X						X					X							P	30	20	50
D18	0	41.326539	19.430616	76	500	N2-1h	X	X						X												P	15	70	15
S2	0	41.280351	19.521724	97	755	N1-3m	X	X	X			X														P	40	35	25
S3	0	41.267720	19.531784	80	1180	N1-3m	X	X	X			X			X			X								P	20	50	30
K1	0	41.176504	19.480849	65	560	N2-2rr	X	X				X	X		X				X							N	50	40	10
K2	0	41.166942	19.483502	105	780	N2-1h	X					X		X				X								P	10	30	60
K3	0	41.146074	19.473055	125	990	N2-1h	X	X				X														N	10	20	70
K4	0	41.139322	19.452541	45	950	N2-2rr	X	X					X					X								N	50	30	20
K5	0	41.149925	19.490417	98	1910	N2-2rr									X	X			X							P	40	30	30
K6	0	41.164454	19.488782	75	1260	N2-2rr		X							X	X										N	50	30	20

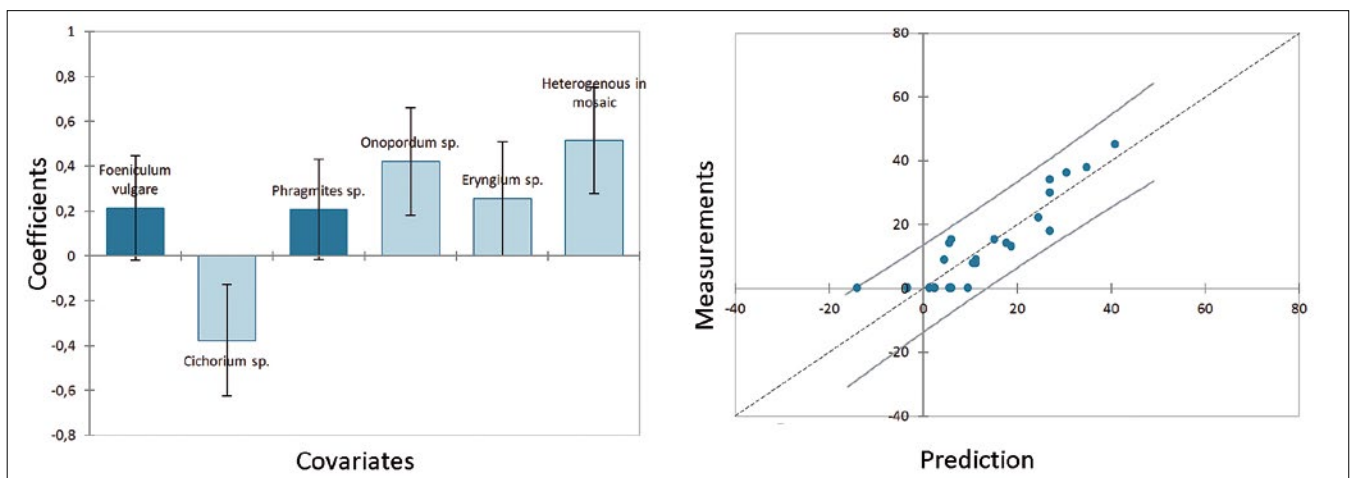


Figure 6 – Identified covariates of the relative abundance of Uromenus dyrrhachiacus. Light blue means p-value < 0.05, Darker blue means p-value < 0.07.

abundance and density, so this variable cannot be used with presence/absence only.

We found that *Saga natoliae* Serville, 1838 was generally present in biotopes suitable for *Uromenus dyrrhachiacus*, and more frequently where the Albanian Saddle Bush-cricket was also abundant.

In natura, along the summer, the population size decreases relatively quickly (about 40% per fortnight), probably due to the natural predation and the increasingly dry biotope.

Discussion

It should be noted that the central area, where the *Uromenus dyrrhachiacus* is relatively abundant has not always been a natural habitat. In the past, there were olive groves and vineyards on the slopes of the hill, which were cultivated in a traditional way, preserving wild flowers and bushes between these agricultural areas. More than 20 years ago (according to elderly inhabitants), there was a fire and cultivation of this part of the western side of the hills was abandoned.

We can assume that the original habitat of the species was a matorral type formation of holm oak (*Quercus ilex*), probably adjacent to wetlands (abundant before the strong human influence on this region and marsh drainage), which could explain the affinity of the species with *Phragmites*.

Today, the species is found in environments that have been more or less radically altered by human activity (soil movement, fires, plantations, overgrazing by cattle, etc.). It seems to have adapted to the pioneer vegetation, characteristic of these modified environments, allowing it to complete its life cycle. The mosaic structure of the vegetation, with the presence of numerous groves of woody or ligneous vegetation, is an important factor that allows it to survive in its new habitats and, in particular, to protect itself from predators and the extreme heat of summer.

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References

- Cigliano, M.M., H. Braun, D.C. Eades & D. Otte (2025). Orthoptera Species File. Available at: <http://orthoptera.speciesfile.org>. Last accessed 31.3.2025.
- Chobanov, D.P., Hochkirch, A., Iorgu, I.S., Ivkovic, S., Kristin, A., Lemonnier-Darcemont, M., Pushkar, T., Sirin, D., Skejo, J., Szovenyi, G., Vedenina, V. & Willemse, L.P.M. (2016). *Uromenus dyrrhachiacus*. *The IUCN Red List of Threatened Species 2016*. Available at: <https://www.iucnredlist.org/species/68486027/70272071>
- Heller, K.-G., Puskás, G., Szövényi, G. & Chobanov, D.-P. (2021). Songs in the genus *Uromenus* (Orthoptera: Tettigoniidae: Ephippigerini): A review with new information about some species. *Zootaxa* 4991 (1), 93-115.
- IUCN (2012). *IUCN Red List Categories and Criteria: Version 3.1. Second edition*. IUCN, Gland, Switzerland and Cambridge, UK. Available at: <https://www.iucnredlist.org/resources/categories-and-criteria>
- Karny, H. (1918). Zwei neue Laubheuschrecken aus Albanien. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* 68, 35-39.
- Lemonnier-Darcemont, M., Darcemont, C. & Halimi, E. (2022). *Uromenus dyrrhachiacus* (Karny, 1918), (Orthoptera: Tettigoniidae), an Albanian endemic species on the brink of extinction. *Articulata* 37, 23-30.
- POWO (2025). *Plants of the World Online*. Facilitated by the Royal Botanic Gardens, Kew. Available at: <https://powo.science.kew.org>. Last accessed 31.3.2025.
- Quézel, P. & Médail, F. (2003). *Écologie et biogéographie des forêts du bassin méditerranéen*. Elsevier, Paris, 592 p.