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Značilnosti larvalnega habitata hromega volnoritca *Eriogaster catax* (Linnaeus, 1758) (Lepidoptera: Lasiocampidae) v Sloveniji

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Nosilec projekta:	Ministrstvo za okolje in prostor Dunajska 48 SI-1000 Ljubljana
Izvajalec naloge:	Center za kartografijo favne in flore Antoličičeva 1 SI-2204 Miklavž na Dravskem polju
Datum:	31. 12. 2021
Nosilec naloge:	Barbara Zakšek, univ. dipl. biol.
Delovna skupina:	Barbara Zakšek, univ. dipl. biol. Nika Kogovšek, univ. dipl. biol. Franc Rebeušek, univ. dipl. biol. Marijan Govedič, univ. dipl. biol.

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Larval habitat characteristics of eastern eggar *Eriogaster catax* (Linnaeus, 1758) (Lepidoptera: Lasiocampidae) in Slovenia

Barbara ZAKŠEK[1], Nika KOGOVŠEK[1], Franc REBEUŠEK[2], Marijan GOVEDIČ[1]

[1]Centre for Cartography of Fauna and Flora, Ljubljana office, Tacenska 20, SI-1000 Ljubljana, Slovenia; E-mails: barbara.zaksek@ckff.si, nika.kogovsek@ckff.si, marijan.govedic@ckff.si
[2]Stara Dečkova cesta 14, SI-3000 Celje, Slovenia; E-mail franc.rebeusek@amis.net

Abstract. The ecology of the eastern eggar (*Eriogaster catax*) in Slovenia has not been well characterized to date. Within the framework of this study, focusing on the larval habitat of the species, a total of 489 caterpillar webs found in different areas of Slovenia were recorded and a number of important variables documented. These included the host plant species, the size of the web, the height of the web from the ground, the height of the host plant, the trunk diameter at ground level, the web aspect and the general habitat characteristics. The most important host plants turned out to be blackthorn (*Prunus spinosa*) and hawthorn (*Crataegus* spp.), with one web found on *Pyrus pyraster* and one on *Amelanchier ovalis*. The web sizes varied largely, with the median size reaching 54 cm^2. The position and height of the web from the ground was correlated with the height of the plant. Most caterpillar webs (67.4%) were oriented to the south, south-west or south-east. 61.5% of caterpillar webs were recorded in temperate heath and scrubs, with the majority of them found in sub-Mediterranean blackthorn-privet scrub (25.4%), followed by Atlantic and medio-European blackthorn-privet scrub (18.0%) and shrub woodland (13.1%). The present study provides the first insight into the ecology of the eastern eggar in Slovenia, focusing on larval habitat. The characterization of the larval habitat is of particular importance for the conservation of the eastern eggar and its potential habitat in Slovenia.

Key words: *Eriogaster catax*, ecology, habitat, caterpillar web, Slovenia, Natura 2000, Habitats Directive

Izvleček. Značilnosti larvalnega habitata hromega volnoritca *Eriogaster catax* (Linnaeus, 1758) (Lepidoptera: Lasiocampidae) v Sloveniji – V članku predstavljamo prvo študijo o ekologiji hromega volnoritca (*Eriogaster catax*) v Sloveniji, s poudarkom na larvalnem habitatu. Skupno smo popisali 489 gnezd gosenic hromega volnoritca v različnih delih Slovenije. Tem gnezdom smo določili oziroma izmerili različne parametre: vrsto hranilne rastline gnezda, njeno velikost, velikost gnezda gosenic, višino, na kateri je bilo gnezdo, usmerjenost gnezda glede na smeri neba, debelino debla rastline pri tleh in tip habitata na mestu lokacije gnezda gosenic. Najpomembnejši hranilni rastlini sta glog (*Crataegus* spp.) in črni trn (*Prunus spinosa*), po eno gnezdo gosenic pa smo našli tudi na drobnici (*Pyrus pyraster*) in šmarni hrušici (*Amelanchier ovalis*). Gnezda gosenic so bila različnih velikosti z mediano (dolžina×širina) pri 54 cm^2. Mesto gnezda gosenic na rastlini, torej oddaljenost gnezda od tal, je odvisna od višine rastline. Večina gnezd gosenic (67,4 %) je bila orientirana proti jugu, jugozahodu ali jugovzhodu. Največ gnezd gosenic (61,5 %) smo našli v resavah in grmiščih v zmernih klimatskih predelih, med temi so gnezda gosenic prevladovala v submediteranskih listopadnih grmiščih (25,4 %), sledijo srednjeevropska toploljubna bazifilna grmišča s kalino in črnim trnom (18,0 %) ter mešani grmičasti gozdovi in površine, zaraščajoče se z listnatimi in iglastimi drevesnimi vrstami (13,1 %). Pričujoči prispevek predstavlja pomembne ugotovitve in predloge, ki jih lahko uporabimo pri varstvu hromega volnoritca v Sloveniji.

Ključne besede: hromi volnoritec, *Eriogaster catax*, ekologija, habitat, Slovenija, Natura 2000, Direktiva o habitatih

Introduction

The eastern eggar moth, *Eriogaster catax* (Linnaeus, 1758) (Lepidoptera: Lasiocampidae), is widely distributed across Europe and Asia, from Northern Spain through Central and Southern Europe to Russia and Western Asia (Ebert et al. 1994). As in many other countries (Kadej et al. 2017), the species distribution is locally aggregated in Slovenia as well (Zakšek et al. 2016). According to the IUCN classification, the species is in the Data Deficient (DD) category (IUCN 1996). It is listed on Annexes II and IV of the Habitats Directive (OJ EC 1992) and in Appendix II of the Bern Convention (Ur. l. RS 1999). The last assessment of the species for the 2013–2018 period revealed an unfavourable conservation status in most EU Member States, including in Slovenia (for Continental biogeographical region) (EIONET 2018). The main reasons for new records of the species in many states is an increase in targeted research (Sáfián 2006, Straka 2006, García-Pérez et al. 2009, Chrzanowski et al. 2013, Bury 2015, Zakšek et al. 2016, Teodorescu & Stănescu 2019) and not the consequence of a shift to a favourable conservation status.

Although the species' distribution in Slovenia has not been well described, current sightings clearly show its distribution in the Goričko region in the NE, Bela krajina in the SE and through central Slovenia to the Primorska region, with most records made in the SW of the country (Zakšek et al. 2016). Sighting of the species in Slovenia have been made in the Atlantic and medio-European blackthorn-privet scrub (31.8121), Sub-Mediterranean blackthorn-privet scrub (31.8122), Xero-thermophile fringes (34.41), Thermophilous and supra-Mediterranean oak woods (41.7) and Hedgerows (84.2) (Čelik et al. 2005) according to the Classification of Palaearctic Habitats (Devilliers & Devilliers-Terschuren 1996).

The research carried out to date on the eastern eggar in Europe has focused on its geographical distribution with limited focus given to local ecology (Sáfián 2006, García-Pérez et al. 2009, Chrzanowski et al. 2013, Bury 2015, Zakšek et al. 2016, Teodorescu & Stănescu 2019), with very few surveys focusing on the ecology and habitat preferences of the species (Ruf et al. 2003, Höttinger 2005, Dolek et al. 2008, Valchářová 2012, Kadej et al. 2017). The moth is a thermophilic species that can be found in warm habitats such as open forests, forest edges, hedges, clearings, or meadows with shrubs where the larval host plants occur. Most studies have shown that *Crataegus* spp. and *Prunus spinosa* are the most important larval host plants, with others like *Pyrus* spp., *Rosa* spp., *Quercus* spp., *Betula* spp., *Populus* spp., *Ulmus* spp., *Dorycnium pentaphyllum* and *Berberis* spp. found to be less common (Bolz 1998, Carron 2009, Höttinger 2005, Dolek et al. 2008, García-Pérez et al. 2009, Valchářová 2012, Kadej et al. 2017, Sitar et al. 2019). The prevailing larval host plant differs across the European habitat of the species. For example, in South western Poland (Kadej et al. 2017) and in Bavaria (Dolek et al. 2008), *Prunus spinosa* is the prevailing host plant. In Danube-Auen National Park in Austria (Höttinger 2005), Cantabria in Spain (García-Pérez et al. 2009) and in the Czech Republic (Valchářová 2012) *Crataegus* spp. is dominant, while in Switzerland (Carron 2009) both *Crataegus* spp. and *Prunus spinosa* are equally significant species.

Even though the eastern eggar was included in Habitats Directive as early as 1992 (OJ EC 1992), there is still a lack of knowledge about its ecology. This research is a prerequisite for the development of effective conservation strategies and management of the species. Importantly, ecological preferences can differ through a species distribution range, as has been found in other Lepidoptera species (Čelik et al. 2015, Lindman et al. 2017, Tartally et. al. 2019). Therefore, detailed knowledge about the species habitat requirements at local scales (Čelik et al. 2015, Kadej et al. 2017) is very important. For species with low mobility, such as the eastern eggar, insight into larval habitat characteristics and oviposition preference is crucial for further conservation actions in the future.

In Slovenia, specimens of eastern eggar and their habitats are legally protected by the national Decree on Protected Wild Animal Species (Ur. l. RS 2004b). The implementation of the Habitats Directive for the eastern eggar in Slovenia is still in progress since Natura 2000 sites have not been fully designated due to poor knowledge of the distribution and ecology of this species (Zakšek et al. 2016). So far, only three Natura 2000 sites have been designated for eastern eggar in western Slovenia: Slovenska Istra (SI3000212), Kras (SI3000276) and Sečoveljske soline in estuarij Dragonje (SI3000240) (Ur. l. RS 2004a, 2013).

No recent surveys have described the species' distribution in Slovenia in detail so far (Zakšek et al. 2016). More specifically, surveys concerning the habitat requirements, life history, population dynamics and conservation management have never been conducted. Čelik et al. (2005) concluded that there is a lack of knowledge about this species' distribution and ecological preferences in Slovenia.

This study is the first in Slovenia and in the Balkan region that specifically characterizes the ecological preferences of the larval habitat of the eastern eggar moth. Focus is given to identification of larval host plants, description of caterpillar webs and the general larval habitat of the species in Slovenia. The findings of this study are a vital contribution to the conservation efforts and protection of the eastern eggar moth and its habitat in Slovenia.

Materials and methods

Study species

Adults of the eastern eggar moth (*Eriogaster catax*) in Slovenia are active in the autumn from September to November (Zakšek et al. 2016). Females lay their eggs in one batch on the host plant covered by a layer of hairs from their abdomen. The eggs overwinter and from the end of March to the beginning of April caterpillars hatch. In first instars, caterpillars live socially on webs built on the host plant, often above the eggs or nearby on the same plant (Pro Natura 2000). This stage lasts from two to four weeks (personal observations). Young caterpillars feed on deciduous trees and shrubs, mainly on *Prunus spinosa* and *Crataegus* spp., while older solitary caterpillars have a wider spectrum of food plants (polyphagus). After three to four weeks caterpillars pupate in a cocoon on the ground (Freina & Witt 1987).

Field surveys

Field data were collected from 2011 to 2020 from the end of March to the end of April (depending on the season) around Slovenia (Fig. 1). Areas were not selected systematically. Most locations were chosen based on historical data of the presence of the species (Zakšek et. al 2016). At each field site we examined potential habitats, such as forest edges, shrubs and hedges with dominant host plants, *Prunus spinosa* and *Crataegus* spp., and searched for caterpillar webs. We only recorded occupied plants in these areas.

For each caterpillar web we recorded the exact location using GPS (Fig. 1). Additionally, the following variables were recorded: (1) the host plant species; (2) the size (length, width) of the web; (3) the height from the ground; (4) the aspect of the web (N, NE, E, SE, S, SW, W, NW) on the plant; (5) the height of the plant (in cm); (6) the trunk diameter at ground level. The total number of measurements differed for individual variables because we were not able to record all variables for some caterpillar webs. In some cases, only the habitat type and no other variables were measured. To avoid misinterpretation, we have included the number (N) of measurement for every variable in the results.

Crataegus host plants were not identified to the species level due to high variability and occurrence of hybrids making identification difficult even for specialists (Martinčič et al. 2007). *C. monogyna* and *C. laevigata* are widespread and common in Slovenia, whereas *C. curvisepala* is rare (Jogan et al. 2001).

Data analysis

Caterpillar web variable data was grouped according to location (marked with different colours and letters in Fig. 1). We used GIS softwares (ArcGIS, QGIS) and Excel for analysis.

To define the habitat type for each caterpillar web we used data from habitat type mapping of Slovenia (Leskovar et al. 2001, Brancelj et al. 2002, Kaligarič et al. 2003, 2018, Babij et al. 2004, Erjavec et al. 2004, 2007, Jakopič et al. 2004, Petrinec & Kovačič 2005, Poboljšaj et al. 2005, Kaligarič & Sedonja 2006, Trčak et al. 2008, 2012, Petrinec et al. 2015, 2020, Trčak & Petrinec 2018). Habitat type mapping, names and codes (Physis) follow the Classification of Palaearctic Habitats (Devilliers & Devilliers-Terschuren 1996) and were adapted and improved in order to fit local conditions in Slovenia (Jogan et al. 2004). We gathered data from habitat mappings for 366 caterpillar webs and habitat types were reasonably combined on different levels.

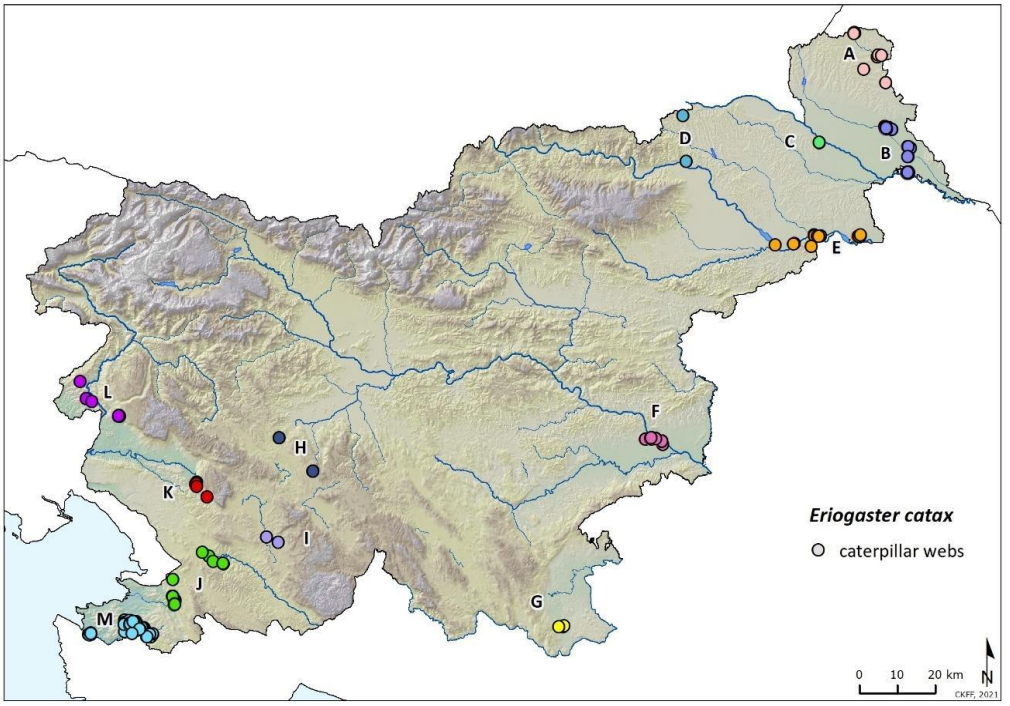

Figure 1. Locations of caterpillar webs of eastern eggar (*Eriogaster catax*) in Slovenia (N=489) in this study.
Slika 1. Lokacije gnezd gosenic hromega volnoritca (*Eriogaster catax*) v Sloveniji (N=489), vključenih v to študijo.

Results

A total of 489 caterpillar webs (Fig. 1) were recorded. The most important host plants were *Prunus spinosa* (49.6%, N=230) and *Crataegus* spp. (50.0%, N=232). One web was found on *Pyrus pyraster* (0.2%, N=1) and one on *Amelanchier ovalis* (0.2%, N=1) (Fig. 2). The finding of a caterpillar web on *Pyrus pyraster* was from Goričko (A) and on *Amelanchier ovalis* from Slovenian Istria (M) (Fig. 2). In most cases (94.3%), there was only a single caterpillar web per host plant. The exceptions were 2 webs on the same plant on 4 different plants of *Prunus spinosa* and on 10 plants of *Crataegus* spp.

In the Goriška region (L), all caterpillar webs were located on *Crataegus* spp. (N=10). In the following regions, the majority of webs were found on *Crategus* spp.: Istria (M) (N=160, 63.8% on *Crataegus* spp., 35.6% on *P. spinosa*), Karst region (J) (N=27, 59.3% on *Crataegus* spp., 40.7% on *P. spinosa*) and Vipava valley (K) (N=11, 63.6% on *Crataegus* spp., 34.4% on *P. spinosa*). An equal distribution between the two host plant species was recorded in areas of Maribor (D) (N=2, 50.0% on *Crataegus* spp., 50.0% on *P. spinosa*), Brežice (F) (N=35, 45.7% on *Crataegus* spp., 54.3% on *P. spinosa*) and Pivka (I) (N=2, 50.0% on *Crataegus* spp., 50.0%

on *P. spinosa*), while in Bela krajina (G) *P. spinosa* was the only host plant (N=4, 100% on *P. spinosa*). It was the dominant species in NE Slovenia (A (N=15, 26.7% on *Crataegus* spp., 66.7% on *P. spinosa*), B (N=126, 38.1% on *Crataegus* spp., 61.9% on *P. spinosa*), C (N=4, 25.0% on *Crataegus* spp., 75.0% on *P. spinosa*) and E (N=65, 38.5% on *Crataegus* spp., 61.5% on *P. spinosa*)) and in central Slovenia (H) N=3, 33.3% on *Crataegus* spp., 66.7% on *P. spinosa*) (Fig. 2).

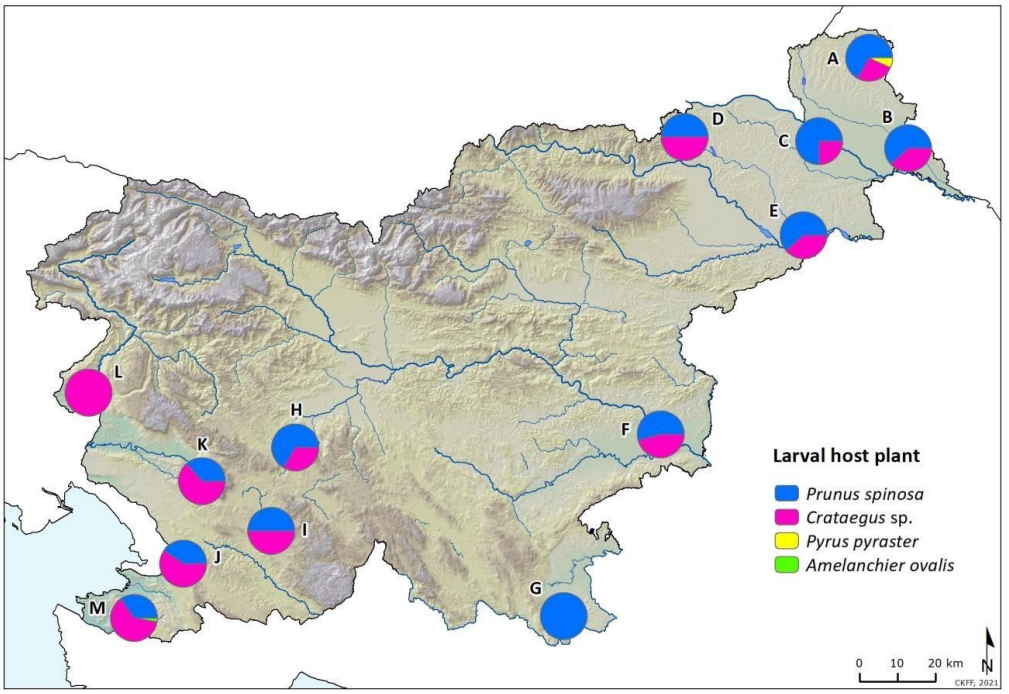

Figure 2. Proportion of eastern eggar (*Eriogaster catax*) caterpillar webs (N=464) on different larval host plants in Slovenia.
Slika 2. Delež gnezd gosenic hromega volnoritca (*Eriogaster catax*) (N=464) na larvalnih hranilnih rastlinah v Sloveniji.

Half of the caterpillar webs had a width between 4 to 7 cm (Me=5 cm, min–max: 1–13 cm, N=423) and length between 8 to 13 cm (Me=10 cm, min–max: 2–28 cm, N=423) (Fig. 3). The median of caterpillar web size in two dimensions (length × width) was 54 cm^2 (Q1–Q3: 35–54 cm^2, min–max: 2–220 cm^2, N=423).

Caterpillar webs were located from 20 to 300 cm from the ground (Q1–Q3: 70–140 cm, Me: 100 cm, N=439) (Fig. 3). The median height of all host plants was 180 cm (Q1–Q3: 130–230 cm, min-max: 40–500 cm, N=408) (Fig. 3). The median height of *Prunus spinosa* with caterpillar webs was 160 cm (Q1–Q3: 120–200 cm, min–max: 40–500 cm, N=211) and 200 cm (Q1–Q3: 150–250 cm, min–max: 90–500 cm, N=195) for *Crataegus* spp. The height of the web from the ground was correlated with the height of the plant (*Crataegus* spp.: $r=0.59$, $p<0.001$, N=192; *Prunus spinosa*: $r=0.73$, $p<0.001$, N=209). The median trunk diameter at the ground level was 3 cm (Q1–Q3: 2–5 cm, min–max: 0.5–25 cm, N=404).

Most caterpillar webs (68.4%) were oriented to the south (38.4%), south-west (15.7%) and south-east (14.3%) (Fig. 4).

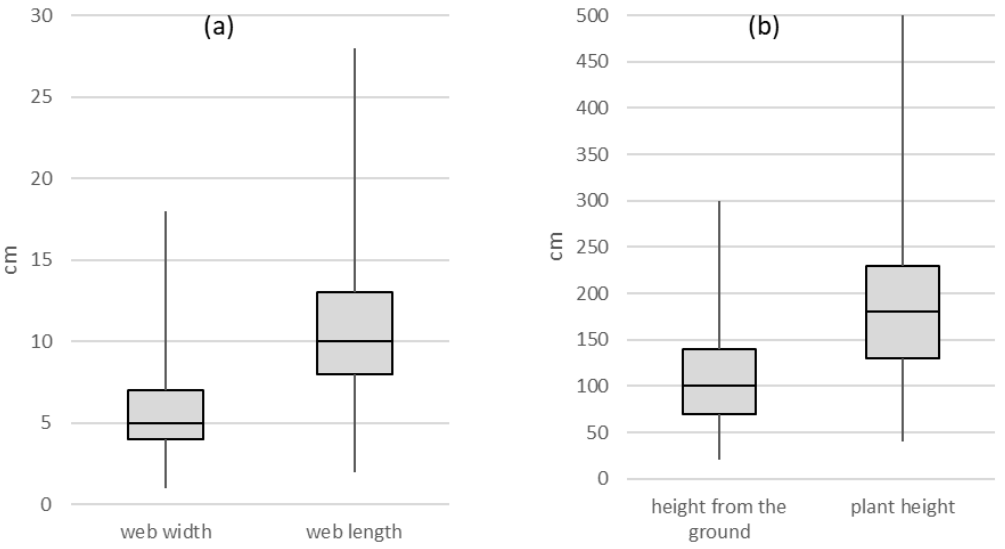

Figure 3. Boxplots of characteristics of eastern eggar (*Eriogaster catax*) caterpillar webs in Slovenia: (a) width and length (N=423); (b) height from the ground (N=439) and plant height (N=408).
Slika 3. Širina in dolžina gnezd gosenic hromega volnoritca (*Eriogaster catax*) (a) (N=423); višina, na kateri je bilo gnezdo najdeno (N=439); (b) višina rastline (N=408).

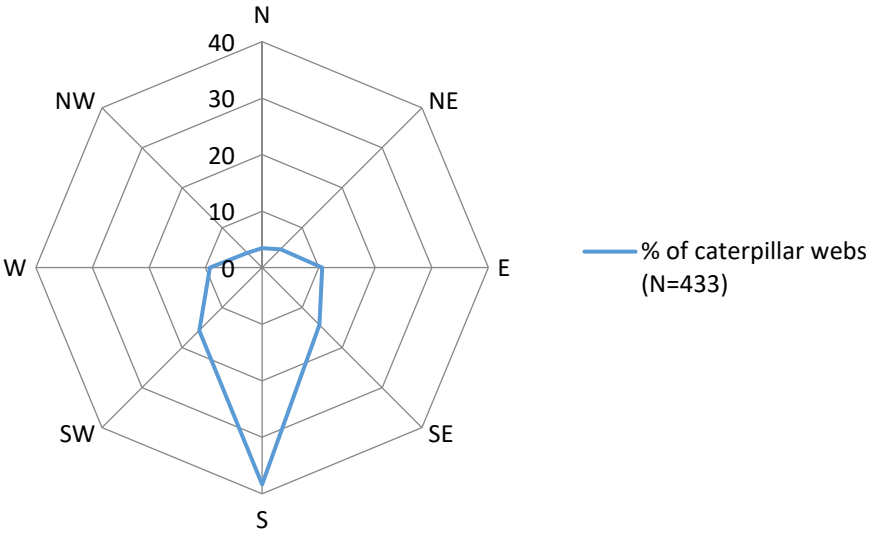

Figure 4. Radar chart of the aspects of the eastern eggar (*Eriogaster catax*) caterpillar webs (N=433) on the larval host plants in Slovenia.
Slika 4. Usmerjenost gnezd gosenic hromega volnoritca (*Eriogaster catax*) (N=433) na hranilnih rastlinah v Sloveniji.

Most caterpillar webs (61.5%) were recorded in temperate heath and shrubs (Physis 31), with the majority of them found in sub-Mediterranean blackthorn-privet scrub (25.4%, Physis 31.8122), followed by Atlantic and medio-European blackthorn-privet scrub (18.0%, Physis 31.8121) and shrub woodland (13.1%, Physis 31.8G, 31.8D, 31.8F). 11.5% of webs were found in steppes and dry calcareous grasslands in different successional stages (Physis 34), 6.6% in different types of forests and 5.7% caterpillar webs in hedgerows (Tab. 1).

Table 1. List of habitat types and % of eastern eggar (*Eriogaster catax*) caterpillar webs (N=366). Names and Physis codes follow Classification of Palaearctic Habitats (Devilliers & Devilliers-Terschuren 1996). Asterixes refer to (Annex I of the Habitats Directive (OJ EC 1992)): * – FFH code 6210(*), ** – FFH code 62A0.

Tabela 1. Seznam habitatnih tipov, v katerih so bila najdena gnezda gosenic hromega volnoritca (*Eriogaster catax*) (N=366) in njihov delež (%). Imena in Physis kode so povzeti po evropski klasifikaciji palearktičnih habitatov (Devilliers & Devilliers-Terschuren 1996). Zvezdice se nanašajo na Prilogo I Direktive o habitatih (OJ EC 1992): * – FFH koda 6210(*), ** – FFH koda 62A0.

Name of habitat type	Physis	% of caterpillar webs
Temperate heath and scrub	31	61.4
Blackthorn-bramble scrub	31.811	4.6
Blackthorn-privet scrub	31.812	0.3
Atlantic and medio-European blackthorn-privet scrub	31.8121	18.0
Sub-Mediterranean blackthorn-privet scrub	31.8122	25.4
Scrub woodland	31.8G, 31.8D, 31.8F	13.1
Steppes and dry calcareous grasslands	34	11.5
Sub-Atlantic semidry calcareous grasslands	34.32*	0.5
Middle European [Bromus erectus] semidry grasslands	34.322*	4.1
Middle European [Brachypodium] semidry grasslands	34.323*	2.2
Mountain savory-chrysopogon dry grassland	34.752**	1.4
Viper's grass dry grasslands	34.753**	1.1
Viper's grass-lime sieglingia grasslands	34.7531-S1**	2.2
Dry siliceous grasslands	35	2.5
Humid grassland and tall herb communities	37	1.6
Mesophile grasslands	38	3.3
Forests	4	6.6
Hedgerows	84.2	5.7
Others		7.4

Discussion

The results of this study show that *Prunus spinosa* and *Crataegus* spp. are the most important larval host plants for populations of eastern eggar in Slovenia. Only two webs out of a total of 464 were found on other host plants (*P. pyraster* and *A. ovalis*). Among the four recorded larval host plants, *P. spinosa* and the genus *Crataegus,* are the most commonly found species in Slovenia. While *P. pyraster* is also widespread, the thermophilic *A. ovalis* is highly present in the SW part of Slovenia, but missing from the NE. Our study does not have sufficient data to explain why more caterpillar webs were not found on *P. pyraster* and *A. ovalis* species, despite being commonly occurring species in areas with recorded eastern eggar presence.

Similar larval host plant preferences and geographical differences have been shown in other surveys. In Switzerland, both species are important host plants (Carron 2009), while in Poland most (92.3%) egg batches were found on *Prunus spinosa* and less on other food plants like *Pyrus* spp., *Rosa* spp. and *Crataegus* spp. (Kadej et al. 2017). Similar results came from Bavaria and Romania, where *Prunus spinosa* was preferred (Dolek et al. 2008, Sitar et al. 2019). In the Czech Republic, more caterpillar webs were found on *Crataegus* spp. than on *Prunus spinosa* (Valchářová 2012). Finally, in Austria caterpillar webs were found only on *Crataegus* spp. (Höttinger 2005). Our study showed only small-scale differences on a national level. Despite regional differences in habitat composition, there was no significant pattern of geographical preferences for host plants in Slovenia. Therefore, we can conclude that both *Prunus spinosa* and *Crataegus* spp. are equally important for conservation of the eastern eggar in Slovenia.

Although some host plants were quite tall and heavily branched, providing space for multiple webs, we observed only a single caterpillar web per plant on most recorded plants (94.3%). In 14 cases (5.7%), two caterpillar webs were found on the same plant. Similarly, a single caterpillar web per plant was found in the Czech Republic (Valchářová 2012) in 95.5% of all cases. The maximum number of caterpillar webs of eastern eggar per plant observed to date was four webs found on a single host plant in the Palava region during the same survey. The authors concluded that females avoid laying eggs on the same plant to avoid competition for resources.

The web sizes (length, width) varied largely in this study. This could be explained by the measured webs being in different phases of development. The surveyed caterpillars ranged in age from the L1 to L3 stadium. Ruf et al. (2003) estimated that caterpillar webs were roughly 300 cm^3 in size, which agrees with our measurements where the median of length × width is 54 cm^2.

The position of the web from the ground was correlated with the height of the plant. On plants higher than 2 m, the webs were not placed below 50 cm. Our results of the height of caterpillar webs from the ground (Q1-Q3: 70–140 cm, range 20–300 cm) are similar to those found in other studies. In Poland, the vertical position of the egg batches ranged from 27–248 cm from the ground (Q1-Q3: 75.5–127 cm; N=436) (Kadej et al. 2017). In Switzerland, the caterpillar webs were found at heights ranging from 25 cm to 220 cm from the ground on *Crataegus* spp. and 30 to 107 cm on *P. spinosa* (Carron 2009).

Most caterpillar webs require much sunlight for development, which they can get with positioning on a southern exposure. Our survey showed that 67.4% caterpillar webs were oriented to the south, south-west or south-east. Similar results were also published by other researchers (Ruf et al. 2003, Höttinger 2005, Dolek et. al 2006, Valchářová 2012, Kadej et al. 2017). Direct exposure to the sun is very important for species that develop in the spring when day and night temperatures are lower, compared to species that develop later in the summer. Caterpillar webs that were not oriented to southern exposures were mostly located on the plant in a way that allowed a lot of sunlight penetration during most of the day. The grasslands with solitary larval host plants or in different stages of succession are the most important habitats for this species. Solitary host plants can also get more direct sunlight. Moreover, preferences for a warm microclimate of the eastern eggar moth were confirmed through the positioning of the caterpillar webs higher in the host tree.

The essential components of the larval habitat of the eastern eggar are larval host plants *P. spinosa* and *Crataegus* spp., which can be found as components in various habitat types (Tab 1). In cases where *P. spinosa* and *Crataegus* spp. are the dominant plants, the habitat type is classified as an independent habitat type with blackthorn (Physis code: 31.811, 31.812, 31.8121, 31.8122). Our study has confirmed that the eastern eggar can be found in different habitat types in Slovenia, from different types of meadows and pastures (with solitary bushes) to hedgerows and forests. We confirmed all habitat types listed in Čelik et al. (2005) and have added others considered important.

The most important habitats for the presence of the eastern eggar were scrubs (which can be found in dry and wet areas), followed by dry calcareous grasslands. Dry grasslands indicate that the eastern eggar in Slovenia is a xero-thermophilic species. On the other hand, humid grasslands indicate that it can also be a thermo-hydrophilic species. In Slovenia, the eastern eggar is present in various locations, such as areas of sporadic river floods and locations in the thermophilic dry karst areas with no surface waters. The low number of caterpillar webs found in the habitat type described as hedgerows (5,7%) in this study could be due to the general classification of shrubs as temperate heath and scrub (Physis code: 31). These habitats can, however, be found in the form of hedgerows, but may not have been classified as such during habitat mapping.

As most caterpillar webs were found on young plants (trunk diameter 2–5 cm), we can conclude that habitats with predominantly old and tall plants, such as hedges, are less important for this species. A favourable habitat for the development of eastern eggar larvae consists of host plants of different ages. We hypothesize that disturbances of the hedges (e.g., partial removal of older plants) can be beneficial for this species. Because of the species' low dispersal potential (Bolz 1998), shrub removal should be limited to targeted and small-scale disturbances only. These should be coordinated in a way that allows removal of older plants in areas where no web development is currently taking place, but would allow younger host plants to thrive in the future and become available for web colonisation. In Slovenia, shrubs can only be removed in autumn and winter, due to national regulations predominantly focused on nesting birds and parturition of mammals. They prohibit shrub removal from March 1st to August 1st. This timing can be devastating for the eastern eggar moth, because it overlaps with the development cycle of the species. By removing host plants in the autumn and winter, egg batches that are on the plants are also being removed. The same applies for other species of Lepidoptera that winter in the stadium of eggs on shrub host plants, like some species of hairstreaks (Theclinae). Our recommendation is that shrubs are not removed during the winter, but during the late spring, when the eastern eggar is in the stadium of pupae in the ground. Additionally, the work should always be done on a small scale. Kadej et al. (2017) suggested that professional inspections should be carried out to exclude the presence of eggs or caterpillars of eastern eggar if cutting is to be done between late September and May.

We did not find any caterpillar webs in shrubs or in hedges bordered by crop fields, which could be the result of using pesticides or some mechanical damage of the plants. We conclude that small hedgerows in intensive agricultural land dominated with crop fields are less important for the target species. In these areas it is important to have hedgerows with plants in different stages (from young to old plants), which are big enough to neutralize impacts of intensive agriculture.

In this study we found only 6.6% of caterpillar webs in the forest. It should be noted that forest was investigated for eastern eggar presence in only a few locations during this study. Some recent findings in Slovenia have shown that some types of forest like black alder forests, e.g. Polanski log and Črni log in the NE part of Slovenia, could be important for this species. In the future we need to put more effort into validating forests as a potential habitat of the eastern eggar. *P. spinosa* and *Crataegus* spp. grow in most forests in the first succession stages and are then replaced by other tree species.

Current landscape management practices are focusing less on implementation of active and dynamic disturbances which facilitate cycles of successions in habitats. These approaches, where important young host plants are allowed to establish themselves in existing habitats, are essential for species such as populations of the eastern eggar moth. Therefore, they should be prioritised in recommendations for conservation efforts of the species.

Povzetek

Hromi volnoritec (*Eriogaster catax*) je vrsta nočnega metulja, ki je navedena v Prilogi II in IV Direktive o habitatih. Osebki te vrste in njihov habitat so v Sloveniji zavarovani z Uredbo o zavarovanih prosto živečih živalskih vrstah. Kljub temu da je poznavanje razširjenosti in ekologije hromega volnoritca nujno za uspešno varstvo vrste, je le-to v Sloveniji še vedno slabo.

V letih od 2011 do 2020 smo skupno popisali 489 gnezd gosenic hromega volnoritca v različnih delih Slovenije. Tem gnezdom smo določili oziroma izmerili različne parametre: vrsta gostiteljske hranilne rastline gnezda in njena velikost, velikost gnezda gosenic, višina, na kateri je gnezdo, usmerjenost gnezda glede na smeri neba, debelina debla rastline pri tleh in tip habitata na mestu lokacije gnezda gosenic. Tistim gnezdom gosenic, za katera so bili na voljo podatki o tipu habitata iz obstoječih kartiranj habitatnih tipov, smo pripisali habitat, v katerem je bilo najdeno gnezdo gosenic.

Najpomembnejši hranilni rastlini sta glog (*Crataegus* spp.) (50,0 %, N=232) in črni trn (*Prunus spinosa*) (49,6 %, N=230), po eno gnezdo gosenic pa smo našli tudi na drobnici (*Pyrus pyraster*) (0,2 %, N=1) in šmarni hrušici (*Amelanchier ovalis*) (0,2 %, N=1). Mediana širine gnezda je bila 5 cm, dolžine pa 10 cm. Mediana velikosti gnezda je bila 54 cm^2. Mediana višine, na kateri je bilo gnezdo, je bila 100 cm, pozicija gnezda gosenic na rastlini pa je odvisna od višine rastline. Večina gnezd gosenic (67,4 %) je bila orientirana proti jugu (38,4 %), jugozahodu (15,7 %) ali jugovzhodu (14,3 %) (N=433).

Največ gnezd gosenic (61,5 %) smo našli v resavah in grmiščih v zmernih klimatskih predelih, med temi so gnezda gosenic prevladovala v submediteranskih listopadnih grmiščih (25,4 %), sledijo srednjeevropska toploljubna bazifilna grmišča s kalino in črnim trnom (18,0 %) ter mešani grmičasti gozdovi in površine, zaraščajoče se z listnatimi in iglastimi drevesnimi vrstami (13,1 %).

Habitat hromega volnoritca sestavljajo skupine hranilnih rastlin različnih starosti, kar pomeni, da je za vzdrževanje habitata nujno odstranjevanje starejše zarasti na manjših območjih. Pri tem je treba poudariti, da lahko odstranjevanje zarasti v zimskih mesecih vodi tudi v odstranitev nemobilnih stadijev hromega volnoritca (jajčec), torej lahko vrsto dodatno ogroža. Zato predlagamo, da se odstranjevanje opravi zunaj te sezone, ali pa se pred odstranjevanjem grmovne zarasti v zimskih mesecih predhodno preveri, ali morda obstajajo jajčeca hromega volnoritca v grmiščih.

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