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Habitat Characterisation of *Chrysopa* Leach, 1815 Genus in the Amanos Mountains

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Abstract: We analyzed habitat requirements and characterisation of *Chrysopa* genus Leach 1815 (Neuroptera:Chrysopidae) in the Amanos Mountains. The genus habitat characterisation and preferring poorly known, although they play a vital role as biological agents in ecology, and have great potential significance as biological indicators for assessing habitat quality. This genus has been found at 102 locations with 344 specimens, standing pine trees, characterized by large diameter, but avoided trees in north locations. This paper represents a first Pioneer step towards elucidating an habitat-based interaction of biological integrity for lacewings interaction assessment. This study was carried out to the impact of habitat quality and characterisation on the *Chrysopa* genus and abundancy of the different forest and severeal vegetation systems.

Keywords: Species diversity, Habitat assesment, Amanos Mountains, Neuroptera, *Chrysopa*

Amanos Dağları'nda Chrysopa Leach, 1815 Cinsinin Habitat Karakterizasyonu

Öz: Bu çalışmada Amanos Dağları'nda Chrysopa Leach 1815 (Neuroptera:Chrysopidae)'nın habitat gereksinim ve karakterizasyonu analiz edilmiştir. Habitat kalite değerlendirmesinde biyolojik indikatör olarak büyük bir potansiyel değeri olan ve bunun yanısıra ekolojide biyolojik ajan olarak hayati önem taşıyan bu cinsin habitat tercih ve karakterizasyonu çok az bilinmektedir. Çalışma alanında, cinsin 102 farklı lokaliteden 344 örneği toplanmıştır. Çalışma, dantela kanatlıların habitat tabanlı interaksiyonlarının aydınlatılması adına öncül bir adım niteliğindedir.Bu çalışma, Chrysopa cinsinin habitat karakterizasyon ve niteliğinin etkisini değerlendirmek için yapılmıştır.

Anahtar Kelimeler: Tür Çeşitliliği, Habitat Değerlendirmesi, Amanos Dağları, Neuroptera, Chrysopa

1. Introduction

The genus *Chrysopa* contains several important species of predatory insects of which the common green lacewing and a potential predator on many soft bodied insects. It has significant potential for commercialization and use against a variety of crop pests in combination with other insect pest management tactics. The larvae of green lacewings, family Chrysopidae, mostly feed on aphids, psyllids and other soft-bodied arthropods, and thus are reared commercially for biological control agent in so many European countries and on different continents (Duelli et al., 2014). The Amanos Mountains are a bridge where the Taurus Mountains, Lebanon Mountains, and North Syrian Desert meet. They are important

because they allow species belonging to this region to disperse among these areas On account of their geographical position, these mountains are one of the most tectonically active ranges in the world, so they possess a unique importance. For this reason, these mountains are notable for their biodiversity.

The Amanos Mountains also serve as a bridge both geographically and biologically. They connect the Black Sea to the Mediterranean Sea and grasslands to coastal regions. They are 175 km in length, with Mığır Peak (2,240 m) east of Dörtyol as their highest point. These mountains have one of the most unique ecosystems of Anatolia, with a relictual flora of the Black Sea climate zones, a legacy of the Ice Ages. The mountains have moist and deep valleys, steep peaks rising abruptly from sea level, and distinctive climatic characteristics (Avgın, 2014).

The main goal of this paper was to identify habitat requirements and characterisations of this genus in the Amanos Mountains (In the South of Turkey), in the different habitat types and qualities.

2. Materials and Methods

The identification of all *Chrysoperla* species treated here was based on morphological and genital traits.

2.1. Study Area

The Amanos Mountains with a great deal biodiversity playing a significant role in many respects this region as which is strongly influenced (Figure 1). The Amanos Mountains connecting the Eastern Mediterranean region to the mountain ranges, which is called the `Anatolian diagonal', provides a route by which floristic elements originating to the north can migrate to the area. This increases consid- erably the number of plant species in the Eastern Mediterranean. Amanos Mountains there are 880 species of flora, and the endemism rate is 4.5%. This region consists of three main vegetation belts. There are 14 plant taxa on the global scale and 149 plant taxa in endagered in the European scale in the Amanos Mountains. The distribution of Amanos Mountains fluorescence according to plant geography is as follows; Mediterran (57%), Europe-Asia 12%, Sub Mediteran 4.5%, Europe 5%, Endemic 3%, Peloe-Temper 5%, Turkey 1.5%, Iran- Turan 2.5%. Circum boreal 2%, Paleo-subtropical 2%, Cosmopolitan 2%. Auxin-derived so many taxon never seen in the sub-region of *Taurus* such as *Fagus orientalis* Lipsky., *Carpinus betulus* L., *Alnus glutinosa* (L.), Gaertn. subs. are found in the sub-region of Amanos (Güzelmansur and Lise, 2013).

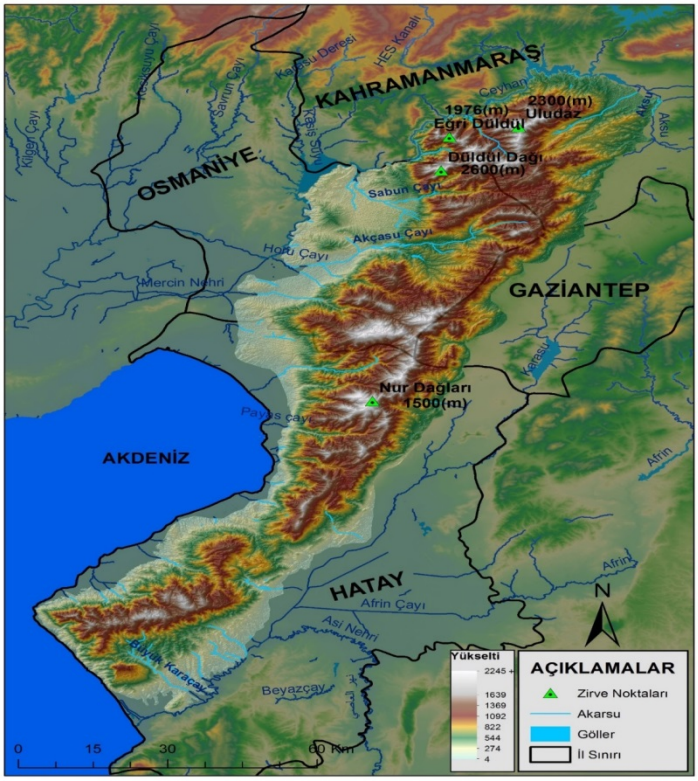

Figure 1. Amanos Mountains map

2.2. Sampling Methods, Processing, and Identification

185 total samples (10 to 45 samples per collection locality) were collected weekly from mid-May until mid- August 2017. The qualitative assessment of the samples abundance was performed in the field using the following categories: high density +++, density++ and low density +.

Samples were placed in plastic collection jars, brought to the laboratory, sorted, and identified. Some immature stages were kept alive in standard emergence jars to establish association between larval and adult stages.

After specimens were captured, they were killed in jars with ethyl acetate, kept in paper envelopes and brought to the laboratory. They were relaxed in boxes with water vapour and then spread out. Each specimen was examined and were then labelled and put in boxes as entomological museum materials, according to Ari et al. (2007), Aspöck et al. (1980), and Şengonca (1980) were followed to identify the specimens. All the specimens are stored in the Zoological Museum of the Faculty of Applied and Science at Ahi Evran University, Kırşehir, Turkey.

3. Result and Discussion

Table 1. Host trees and characteristics of *Chrysopa* genus in the Amanos Mountains for all localities

Ecosystem Type						
Forest Type					Forest Edge	Scrubland
Pine Forest	Spruce and mixed forests	Deciduous Forests	Natural old mixed forests	Recently burnt areas	Shaded Trees	Mixed Scrubland
+++	+++	+	+++	+	++	++

+++: high density ++: density +: low density

Table 2. Specimens abundance of *Chrysopa* genus in the landscape types for all localities

Landscape type							
Mountainous	**Abundance**	**Plain**	**Abundance**	**Hilly**	**Abundance**	**Fields**	**Abundance**
***Abies* sp.**	+++	*Arbutus* sp.	+++	*Lauroserasus* sp.	++	Corn	+++
***Fagus* sp.**	+++	*Hedysarum* sp.	+	*Taxus* sp.	++	Wheat	+++
***Cedrus* sp.**	+++	*Glycyrrhiza* sp.	+++	*Erodium* sp.	+	Barley	++
***Quercus* sp.**	+++	*Ferulago* sp.	+++	*Thlaspi* sp.	+	Forage Crop	+++

+++: high density ++: density ++: low density

Table 3. Impact site habitat assessment of *Chrysopa* genus in the landscape types in the survey area.

Habitat Quality attributes	Optimal	Suboptimal	Marginal	Poor
Native perennial grass cover	1	1	2	1
Organic litter	2	2	1	2
Large trees	3	3	2	3
Weed Cover	4	4	3	4
Size of Patch (fragmented)	1	1	3	2
Ecological corridors	2	2	1	1
Distance from water	3	3	2	2
Shrubs	4	4	3	3
Coarse woody debris	1	3	4	4
Forbs	1	2	2	2

1:significantly below average, **2**:average, **3**: above average **4**: significantly above average

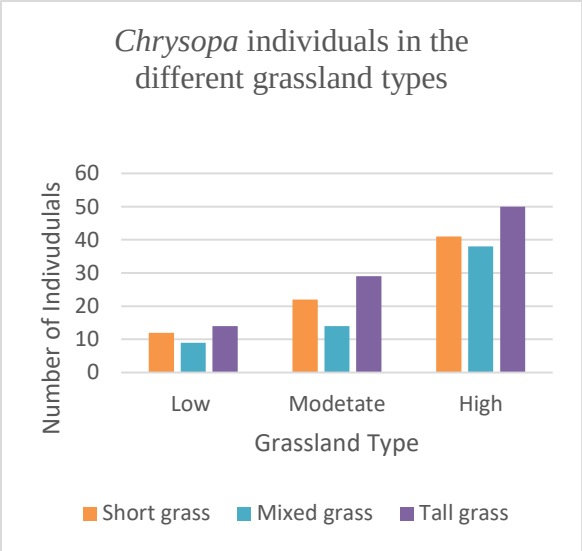

Figure 2. The number of *Chrysopa* individuals in the survey area

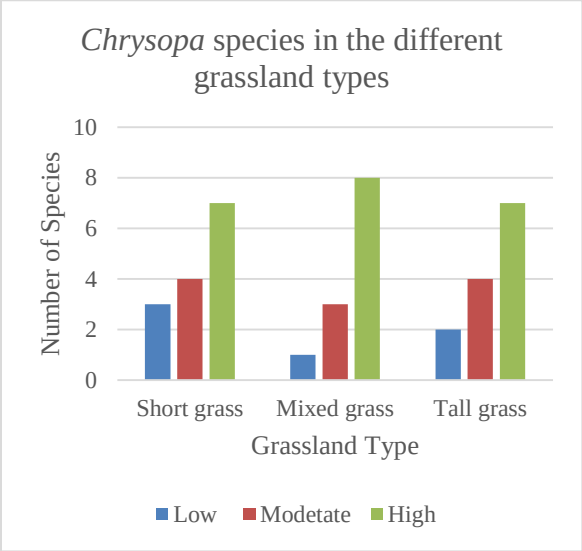

Figure 3. The number of *Chrysopa* species in the survey area

In the paper we determined that there are high density species belong to *Chrysopa* genus in the Pine Forest, Deciduous Forests and Natural old mixed forests. It was observed that Deciduous Forest had a low density. Also we observed that there were low density on *Hedysarum* sp. and *Thlaspi* sp. showed in the Table 2.

Edge effects and the suitability of habitats for forest arthropods have usually been known. This researching uses an approach for elucidating the habitat type and quality of species belong to *Chrysopa* (Stelz and Devetak, 1999, Chima et al.,2013).

Habitat asssesment has been carried out according to Abed and Stephens (2002) and Gibbons and Freudenberger (2006) in the survey area in the Table 3. Our findings on the differential habitats and vegetation steps provide some insight and raise some questions regarding the distribution and interaction of this genus.

Plant-insect interactions and plant-forest types that construct shelters for resting on their plants provide ample opportunities for examining the impacts of different ecosystem types on the lacewings. In evaluating the importance of lacewing habitat, the abundance, size and spatial distribution of are likely to be more important than their species richness. Therefore, the paper present a good opportunity to investigate structure and links between habitat quality, type and lacewings (Neuroptera:Chrysopidae).

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