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Bazı Çukur-Tuzak Kuran Karıncaaslanı Larvalarının Mevsimsel Çokluğu ve Çeşitliliği (Neuroptera: Myrmeleontidae)

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Öz: Bu çalışmada, Amanos Dağları'nda 2015 Mayıs-2016 Ekim ayları arasında aslankarıncası larvalarının (Neuroptera: Myrmeleontidae) mevsimsel varyasyonları ve tür çeşitliliği tartışılmıştır. Aslankarıncaları'nın da içerisine dahil olduğu böcekler, küresel ısınmayı karakterize etmede biyoindikatör rol oynarlar. Diğer organizmalar gibi böcekler de iklimsel değişikliğin etkisi altındadırlar. Bu araştırmadaki öncül adım, aslankarıncaları'nın kurak mevsimlerde hayatta kalmaları için adapte oldukları, bulunuş ve bolluklarına etki eden bazı çevresel (sıcaklık, nem, gün ışığı, toprak, rüzgar) faktörler olmuştur. Türlerin bolluğunu etkileyen olası nedenler tartışılmıştır. Çukur tuzak yapan aslankarıncaları'nın yoğunluğu ile abiyotik faktörler arasındaki olası ilişkiler de öne sürülmüştür.

Seasonal abundance and diversity of some pit building antlions larvae (Neuroptera: Myrmeleontidae)

Keywords: Amanos Mountains, Antlion, Pit fall trap building, Turkey

Abstract: The paper discusses the seasonal variations and species diversity of antlions (Neuroptera:Myrmeleontidae) in the Amanos Mountains during May, 2015 to October, 2016. The insect including antlions may play a role as bio indicator to characterize the global warming. Like other organisms, insects are also under the influence of climate change. The present investigation in among preliminary steps to identify insects adapted to survive in dry season and some environmental factors (temperature, humidity, sunlight, soil, wind) impacting their presence and abundance. Possible seasonal causes of fluctuations in their abundances have been discussed. A possible interaction between abiotic factors and the abundance of antlions (pit fall trap) is proposed.

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Introduction

Pit building antlions (Neuroptera: Myrmeleontidae) construct conical traps in dry, loose substrate and wait for their prey at the bottom of the trap. build inverted conical pits on the sand surface to capture their prey. larvae (Neuroptera Myrmeleontidae) are sand-dwelling insects, but only a few antlion species build pitfall traps, which is considered to be the most specialized strategy within the family Myrmeleontidae for capturing prey [1,2,3,4,5]. Myrmeleontidae, commonly known as antlions, are the most species-rich family of the order Neuroptera, including 1657 described species [6.7]. Similarly to other sitand-wait predators, antlion larvae are generalist predators that capture small arthropods (mainly ants) falling into their pits [8].

Biodiversity has received recent national and international recognition. The importance of biodiversity arises from the fact that the world depends on self-sustaining biological systems that include many kinds of organisms. Knowledge of biodiversity is required to understand the natural world and the natural and artificial changes it may undergo; and in turn, such knowledge permits the wise use and management of ecosystems, both as elements of natural heritage and as reservoirs of actual and potential resources.

Among the Turkish natural areas, Amanos mountains are by far the richest of plant species, many endemic, with a flora of 91 families, 419 genera and 880 species. Amanos Mountains contain consequently about a half of all genera of plant recorded from Turkey, about 850 following Davis (1965-1988). Regarding the Mediterranean flora elements, they partecipate the Flora of Amanos Mountains with a percentage more than twice that of the whole Turkey [9]. The unknow situation of the Fauna should be very similar, with a number of endemic species and still undetected taxa. The naturalistic interest and the richness in species derive from both ancient and recent geography, clima and ecology of these focal Mediterranean territory [10].

The biodiversity of the pit building antlions larvae (Neuroptera: Myrmeleontidae) of Amanos Mountains has been insufficiently investigated up to now.

The aim of the present study is to investigate the biodiversity of the pit-building ant-lion larvae living in open or protected microhabitats in Amanos Mountains.

Material and Methods

Myrmeleon formicarius and *Euroleon nostras* (Fourcroy, 1785) are the most abundant pit-building antlion in Turkey. The samplings were carried out in all three larvae stages (L1, L2, L3) in a 10 x10 series by pits.

In the Amanos Mountains, the larva was removed from its funnel using a spatula. The larva collected was put in a plastic film box with dry soil from its site of collection. The box was labelled, and brought back to the laboratory where the larva was farmed. The label of each box contained the following information: The site and date of collection, sample number, location coordinates and the name of the plant from which it was collected. In the study we collected 43 antlion larvae in the field and brought them to the lab. For this experiment we chose first, second and third instar larvae. The larvae were fed with one flour beetle larva (of approximately 1 mg), starved for a week and were afterwards placed in aluminum trays (25 × 17 cm) at varying densities (one or four individuals per tray) and sand depths (2 or 4 cm).

Results

Table 1 shows the seasonal activity of antlion larvae. The maximum larvae has been collected in May and June in the survey area. It appears that wetlands are the most abundant habitat, representing 33.33%, followed by oak forests with 25% for *M. formicarius* and finally fagus forests with 20.8 %. For *E. nostras* the most abundant habitat represents with 47.3% in the pine forests.

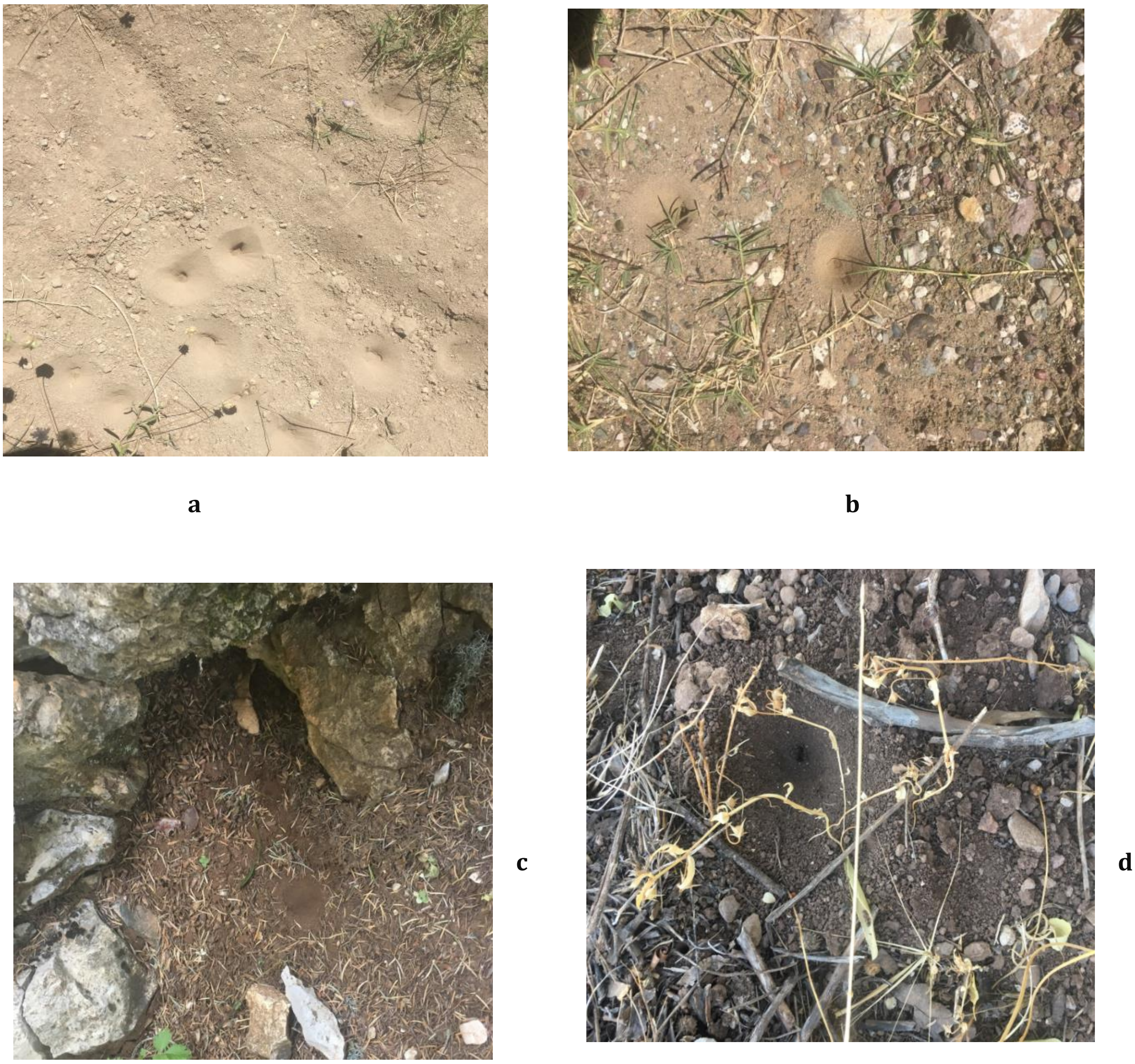

Figure 1. *M. formicarius* (left) (a, b) and *E. nostras* sand pit trap (c, d)

The depth and diameter were noted without disturbing the antlion larvae. Pit diameters and depth were measured to the nearest mm. The soil temperature of the study area was between 24°C-41°C. We observed that there is no releationship between the pit size of antlions and soil temperature during survey.

Table 4 shows the pit size of both *M. formicarious and E. nostras* ranges from 9-18mm and 8-16mm, respectively.

This results could be explained by the fact that *M. formicarious* has a capacity to adapt to the wetlands environmental conditions. These results are in agreement with those in Devetak (2008), Scharf and Ovaida (2006) and Elimelech and Pinshow (2008) who showed that some species appear in the wetlands including lakes, dam periphery and puddle [11,12,13].

These results show that there is no releationship between the size of pit and habitat preference in both species.

Discussion

For antlion larvae trap size depends on to sand particle size appears to be of key importance for ef cient sit-and-wait and sit- and-pursue predatory strategies. In natural habitats including Amanos Mountains, pit- constructing antlion larvae are capable of discriminating between areas of habitat and environmental factors (temperature, humidity, sunlight, soil, wind) [14,15,16,4,17].

In the survey area humidity and wind has been found constantly during all the survey working. Soil types and sunlight has been differed depends on the habitat.

Table 1: Seasonal variation of the antlion larvae during 2015 May-2016 October

Species	Total	May	June	July	Sep	Oct
Myrmeleon formicarius Linnaeus, 1767	**24**	**13**	**5**	**3**	**2**	**1**
Euroleon nostras (Fourcroy, 1785)	**19**	**8**	**5**	**2**	**2**	**2**

Table 2: Numbers of individuals and species collected from each study area.

Species	1 st Instar	2nd Instar	3 rd Instar
M.formicarius Linnaeus, 1767	**12**	**8**	**4**
E. nostras (Fourcroy, 1785)	**7**	**11**	**1**

Table 3. Relationship between ant lion larvae and the habitat types

Habitat Type	Species	
	***M. formicarius* Linnaeus, 1767**	***E. nostras* (Fourcroy, 1785)**
Oak Forest (n=14)	6	2
Shrubbery (n=11)	1	2
Pine Forest (n=17)	4	9
Wetlands (n=29)	8	3
Fagus Forest (n=10)	5	3

Table 4. Pit size of antlion larvae trap diameter

Species		Larvae Code	Trap diameter (mm)	Soil Temperature
***M.formicarius* Linnaeus, 1767**	**1st Instar**	**L1MA**	**11**	**24°C**
		L1MB	**10**	**25°C**
		L1MC	**11**	**30°C**
		L1MD	**12**	**30°C**
		L1ME	**10**	**27°C**
		L1MF	**11**	**26°C**
		L1MG	**9**	**24°C**
		L1MH	**12**	**30°C**
		L1MI	**11**	**33°C**
		L1MJ	**10**	**33°C**
		L1MK	**12**	**32°C**
		L1ML	**10**	**26°C**
	2nd Instar	**L2MA**	**14**	**27°C**
		L2MB	**13**	**25°C**
		L2MC	**15**	**25°C**
		L2MD	**15**	**39°C**
		L2ME	**15**	**39°C**
		L2MF	**13**	**27°C**
		L2MG	**14**	**24°C**
		L2MH	**14**	**35°C**
	3rd Instar	**L3MA**	**17**	**35°C**
		L3MB	**17**	**30°C**
		L3MC	**18**	**26°C**
		L3MD	**18**	**26°C**
***E. nostras* (Fourcroy, 1785)**	**1st Instar**	**L1EA**	**8**	**37°C**
		L1EB	**9**	**35°C**
		L1EC	**8**	**35°C**

		L1ED	**9**	**34°C**
		L1EE	**10**	**26°C**
		L1EF	**9**	**32°C**
		L1EG	**9**	**26°C**
	2nd Instar	**L2EA**	**11**	**33°C**
		L2EB	**11**	**26°C**
		L2EC	**12**	**38°C**
		L2ED	**12**	**33°C**
		L2EE	**11**	**37°C**
		L2EF	**10**	**39°C**
		L2EG	**10**	**40°C**
		L2EH	**9**	**25°C**
		L2EI	**9**	**26°C**
		L2EJ	**11**	**26°C**
		L2EK	**11**	**27°C**
	3rd Instar	**L3EA**	**16**	**26°C**

L1; 1st Instar, L2; 2nd Instar, L3; 3rd Instar, M; *M. formicarius* Linnaeus, **E:** *E. nostras*

Conclusion

In conclusion, rainfall and temperature are the basic factors influencing abundances of most of the species. However, there appear to be species level differences in the response to these factors such that *M. formicarius* species is more closely dependent on these factors than other species. At present, there is nothing known habitat types, migration, and larval development of antlion species in the Amanos Mountains. Much more local specific information is needed before the causes of seasonal variation can be better understood.

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