

HABITAT PREFERENCES AND ABUNDANCE OF THE DOLICHOPODIDAE (DIPTERA) FROM INNER WEST ANATOLIA

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Abstract

In this study, the habitat preferences and abundance of Dolichopodidae species in the Inner West Anatolia (Afyonkarahisar, Kütahya and Uşak) were investigated by means of a hand net during the years 2009 to 2011. A total number of 4,327 specimens were gathered belonging to 77 species. The majority of identified species in the study area prefer moist and shaded habitats such as fenlands, reedbeds, moist coniferous woodland and moist grasslands, depending on habitat preference. Almost 45 % of the total number of collected specimens belonged to one species (*Syntormon pallipes*). Other abundant species were *Hydrophorus balticus* and *Poecilobothrus regalis*.

KEY WORDS: Dolichopodidae, habitat preferences, abundance, Inner West Anatolia

Introduction

Turkey is one of the countries that have a great diversity of ecosystems. In Turkey, there are three of the seven biogeographical regions: the Mediterranean, the Eurosiberian and the Irano-Turanian. This ecosystem and habitat diversity includes diverse species, some of which are endemic (FAO, 2019). In order to protect the biological diversity of a country, the identification of species and their ecological properties is particularly important. Due to increasing global warming and various anthropogenic influences, our world is polluted. Many wetlands, semi-wetlands and terrestrial areas are threatened with extinction.

Dolichopodidae species generally prefer warm, moist environments, including rivers, marshlands, coastal dunes, heathlands, freshwater seeps and grasslands. Adults are predators and feed on soft-bodied invertebrates. They are found on sand, grass blades, in woodland and on river rocks, especially near water. They are small to medium sized flies and their body length ranges from 0.1 and 0.9 mm. Most adult dolichopodids can be easily identified by their long legs, reduced wing venation, metallic thoracic coloration,

stylus-like arista of antennae, with sparse setation and male genitalia. Dolichopodids play an important role in agricultural areas and are natural enemies of some pests in a variety of habitats (Grichanov & Brooks, 2017).

In the literature, many authors have produced a faunistic list on dolichopodids. However, few of these studies include an ecological note. Moreover, ecological data on adult dolichopodid species are very scarce in the literature (Pollet & Grootaert, 1987; Pollet *et al.*, 1988, Pollet *et al.*, 1989, Meuffels *et al.*, 1989, Pollet & Grootaert, 1991; Pollet, 1992, Pollet & Grootaert, 1994, Pollet & De Bruyn, 2000; Gelbiç & Olejníček, 2011; Kazerani *et al.*, 2013; Vincent, 2013; Küçükberber *et al.*, 2017; Kechev, 2021). Some ecological data on 7 species were given by Tonguç & Barlas (2011) from Inner West Anatolia. In this paper, the habitat preferences and abundance of identified species collected in Inner West Anatolia are given.

Materials and Methods

This study was conducted in provinces of the Inner West Anatolian (Afyonkarahisar, Kütahya and Uşak) region of Turkey. The material for the present work was collected between 2009 and 2011 in 6 different habitat types at 763 localities in the period from April to September (Fig. 1). Field-collected adults were put in vials containing 75% ethanol or in insect envelopes in the field. Specimens were identified in the laboratory using a binocular microscope. All specimens are deposited in Muğla Sıtkı Koçman University, Faculty of Science, Department of Biology, Zoology Laboratory, Muğla, Turkey (MUZL).

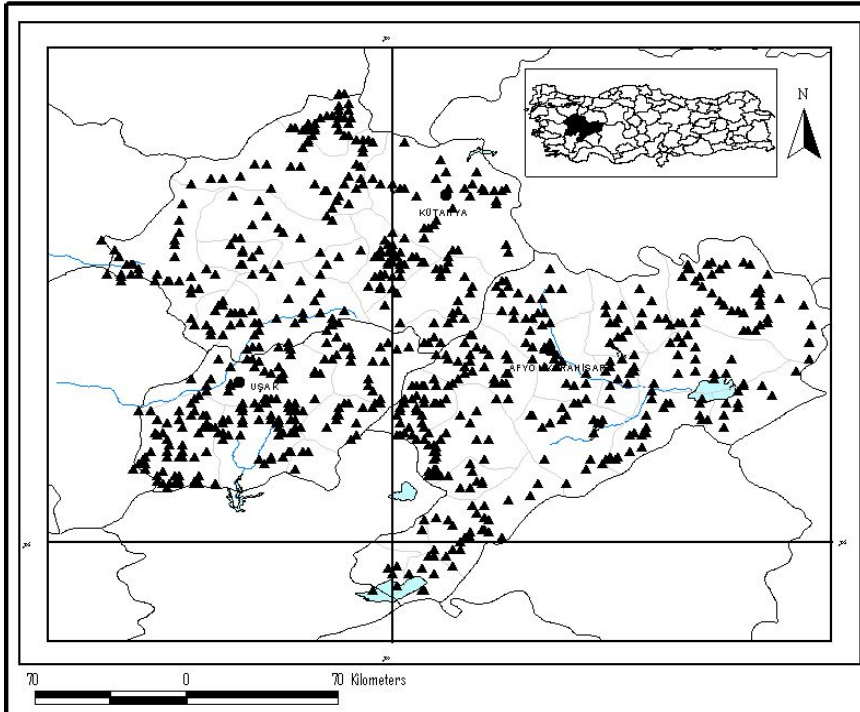


Figure 1. Localities where dolichopodids were collected in the study area.

Some habitat features were noted in the research area. Habitat information of the collected species was given according to Pollet (2000). Adult flies were collected in six habitat types. These main habitat types were defined as follows: (1) marshlands; (2) forests; (3) coastal dunes; (4) grasslands; (5) heathlands, and (6) disturbed habitats. Each main habitat type was subdivided into subhabitat types. Collected specimens were also evaluated according to habitat type.

Individual habitat types were named as follows: AS – aquatic and semiaquatic area; S – stream; P – pond; M – marshland; FL – fenland; RB – reedbeds; W – woodland; DDW – dry deciduous woodland; MDW – moderately humid mixed woodland; HMW – humid mixed woodland; DCW – dry coniferous woodland; HCW – humid coniferous woodland; CD – coastal dunes; LR – littoral rocks; GRL – grassland; DGR – dry grassland; HGR – humid grassland; HHL – humid heathland; MHL – moderately humid heathland.

The abundance of dolichopodid specimens were calculated according to Krebs (1994) using the following formula;

$ni/NT \times 100$ (ni=individuals of species; NT=total number of collected dolichopodid flies).

To determine the abundance of the collected dolichopodid species, the following scale was used: eudominant >7.6%, dominant 5.1%-7.5%, subdominant 2.6%-5.0%, recedent 1.1%-2.5%, subrecedent 0.0%-1.0%.

Research area

Inner West Anatolia is part of Aegean region and is located in the east of the region. It includes three provinces (Afyonkarahisar, Kütahya ve Uşak), 37 districts and 1,145 villages. The study site has an area of 31,446 km² and accounts for 4% of Turkey. The climatic characteristics and vegetation show a transition between the Aegean region and the Inner Anatolia region. The geographical formations are different from those of the western Aegean. There are some mountains that are up to 2,300 m a.s.l. (Akdağ, Murat, Emir, Eğriöz, Sultan and Türkmen mountains).

The Inner West Anatolia region contains one national park (Başkomutan National Historic Park), one natural park (Akdağ), 3 natural reserves (Dandindere, Vakıf Çamlığı and Kasalıç-Domaniç) and 4 natural monuments.

Results and Discussion

A total of 4,327 specimens, 2,582 males and 1,745 females, were collected from six different habitat types in the region of Inner West Anatolia. As a result of identification of these specimens, 77 species were determined. Species are listed by subfamily in Table I with population number, habitats where they were collected, abundance and number of individuals belonging to identified species from the study area.

Table I. List of dolichopodid recorded in Inner West Anatolia in 2009 and 2011, with habitats, abundances and number of individuals.

	Species	Habitats	Abundance	Number of individuals		
				♂	♀	♂♀
Subfamily Diaphorinae Schiner, 1864						
1	<i>Argyra argyria</i> (Meigen, 1824)	S, P, RB, HGR, GRL	0,30	7	6	13
2	<i>Argyra vestita</i> (Wiedemann, 1817)	RB	0,18	8	-	8
3	<i>Chrysotus pennatus</i> Lichtwardt, 1902	S, CD, HGR	0,05	2	-	2
4	<i>Chrysotus pulchellus</i> Kowarz, 1874	S, HGR	0,05	2	-	2
5	<i>Chrysotus suavis</i> Loew, 1857	HGR	0,02	1	-	1
6	<i>Diaphorus hoffmannseggii</i> Meigen, 1830	S	0,02	1	-	1
Subfamily Dolichopodinae Latreille, 1809						
7	<i>Dolichopus austriacus</i> Parent, 1927	S, RB	0,67	29	-	29
8	<i>Dolichopus calinotus</i> Loew, 1871	RB, HGR	0,20	9	-	9
9	<i>Dolichopus excisus</i> Loew, 1859	RB, MDW, HMW, HGR, GRL	0,86	30	7	37
10	<i>Dolichopus latilimbatus</i> Macquart, 1827	S, RB, HGR	0,39	17	-	17
11	<i>Dolichopus nubilus</i> Meigen, 1824	S, RB, HGR	0,23	8	2	10
12	<i>Dolichopus perversus</i> Haliday, 1838	FL, HGR	0,12	2	3	5
13	<i>Dolichopus sabinus</i> Haliday, 1838	RB, HGR	0,02	1	-	1
14	<i>Dolichopus signifer</i> Haliday, 1832	FL, DDW, HGR, HHL	2,50	76	32	108
15	<i>Hercostomus anatoliensis</i> Tonguç et al., 2016	S, FL, HGR, HCW	0,21	9	-	9
16	<i>Hercostomus apollo</i> (Loew, 1869)	P, HGR	0,12	4	1	5
17	<i>Hercostomus chetifer</i> (Walker, 1849)	HCW	0,02	1	-	1
18	<i>Hercostomus convergens</i> (Loew, 1857)	RB	0,07	3	-	3
19	<i>Hercostomus fulvicaudis</i> (Haliday, 1851)	HCW, HGR	0,32	1	13	14
20	<i>Hercostomus gracilis</i> (Stannius, 1831)	S, P, RB, HCD, CD, HGR	2,84	87	36	123
21	<i>Hercostomus griseifrons</i> Becker, 1910	S	0,12	5	-	5
22	<i>Hercostomus longiventris</i> (Loew, 1857)	HGR	0,02	1	-	1
23	<i>Hercostomus phoebus</i> Parent, 1927	S, RB, HCW, HGR	0,99	18	25	43
24	<i>Ortochile nigrocoerulea</i> Latreille, 1809	HGR	0,02	1	-	1
25	<i>Poecilobothrus chrysozygos</i> (Wiedemann, 1817)	FL, HGR	0,09	3	1	4
26	<i>Poecilobothrus principalis</i> (Loew, 1861)	CD, HGR	0,02	1	-	1
27	<i>Poecilobothrus regalis</i> (Meigen, 1824)	S, P, FL, RB, HMW, HCW, CD, HGR	11,50	314	183	497
28	<i>Sybistroma crinipes</i> Staeger, 1842	HCW	0,02	1	-	1
29	<i>Sybistroma impar</i> (Rondani, 1843)	HCW	0,14	6	-	6
30	<i>Sybistroma lorifera</i> (Mik, 1878)	DGR	0,58	13	12	25
31	<i>Sybistroma nodicornis</i> Meigen, 1824	RB, HGR	0,60	22	4	26
32	<i>Sybistroma sphenoptera</i> (Loew, 1859)	S	0,02	1	-	1
33	<i>Tachytrectus notatus</i> (Stannius, 1831)	S, CD, HGR	0,44	14	5	19
Subfamily Hydrophorinae Lioy, 1864						
34	<i>Hydrophorus balticus</i> (Meigen, 1824)	S, P, RB, MDW, HCW, CD, HGR, HHL	11,06	239	239	478
35	<i>Hydrophorus praecox</i> (Lehmann, 1822)	S, HGR	0,05	1	1	2
36	<i>Liancalus virens</i> (Scopoli, 1763)	S, HCW, HGR	0,19	5	3	8
37	<i>Orthoceratium lacustre</i> (Scopoli, 1763)	RB	0,12	2	3	5
38	<i>Scellus notatus</i> (Fabricius, 1781)	RB	0,05	1	1	2
39	<i>Thinophilus (Schoenophilus) versutus</i> Haliday, 1851	HGR	0,09	2	2	4
Subfamily Medeterinae Lioy, 1864						
40	<i>Medetera muralis</i> Meigen, 1824	DGR	0,02	1	-	1
41	<i>Medetera perfida</i> Parent, 1932	DCW	0,02	1	-	1
Subfamily Neurigoniinae Aldrich, 1905						
42	<i>Neurigona abdominalis</i> (Fallén, 1823)	HMW	0,02	1	-	1
43	<i>Neurigona erichsoni</i> (Zetterstedt, 1843)	HMW	0,02	1	-	1
44	<i>Neurigona suturalis</i> (Fallén, 1823)	HMW	0,07	3	-	3
Subfamily Peloropeodinae Robinson, 1970						
45	<i>Peloropodes acuticornis</i> (Oldenberg, 1916)	HCW	0,14	5	1	6
Subfamily Rhapsiniinae Bigot, 1852						
46	<i>Rhaphium albifrons</i> Zetterstedt, 1843	HGR	0,02	1	-	1
47	<i>Rhaphium appendiculatum</i> Zetterstedt, 1849	S, RB, HCW, HGR, GRL	0,58	25	-	25
48	<i>Rhaphium brevicorne</i> Curtis, 1835	S, RB, HGR, GRL	0,35	15	-	15
49	<i>Rhaphium caliginosum</i> Meigen, 1824	S, FM, HGR	0,58	25	-	25
50	<i>Rhaphium fascipes</i> (Meigen, 1824)	FM, HGR	0,14	6	-	6
51	<i>Rhaphium laticorne</i> (Fallén, 1823)	S, HGR	0,21	9	-	9
52	<i>Rhaphium micans</i> (Meigen, 1824)	HGR	0,12	5	-	5
Subfamily Sciapodinae Becker, 1917						
53	<i>Sciapus flavicinctus</i> (Loew, 1857)	S, HGR	0,07	3	-	3

Species	Habitats	Abundance	Number of individuals		
			♂	♀	♂♀
54 <i>Sciapus heteropygus</i> Parent, 1926	S	0,02	1	-	1
55 <i>Sciapus maurus</i> Parent, 1930	S	0,02	1	-	1
Subfamily Sympycninae Aldrich, 1905					
56 <i>Campsicnemus barbithibia</i> Stackelberg, 1947	S	0,02	1	-	1
57 <i>Campsicnemus crinitarsis</i> Strobl, 1906	S	0,02	1	-	1
58 <i>Campsicnemus curvipes</i> (Fallén, 1823)	S, RB, HMW, HCW, LR, HGR, GRL	1,73	45	30	75
59 <i>Campsicnemus filipes</i> Loew, 1859	HGR	0,02	1	-	1
60 <i>Campsicnemus magius</i> (Loew, 1845)	HGR	0,02	1	-	1
61 <i>Campsicnemus simplicissimus</i> Strobl, 1906	S, RB, HGR, GRL	0,37	14	2	16
62 <i>Campsicnemus umbripennis</i> Loew, 1856	S, RB, DDW, HMW, HCW, CD, HGR, GRL, HHL	5,34	131	100	231
63 <i>Sympycnus pulicarius</i> (Fallén, 1823)	RB, HCW, HGR, GRL	6,75	235	57	292
64 <i>Sympycnus simplicipes</i> Becker, 1908	S, HGR	0,14	6	-	6
65 <i>Syntormon aulicus</i> (Meigen, 1824)	RB	0,21	7	2	9
66 <i>Syntormon denticulatus</i> (Zetterstedt, 1843)	S, RB, HCW, HGR	0,39	17	-	17
67 <i>Syntormon fuscipes</i> (von Roser, 1840)	HCW	0,21	8	1	9
68 <i>Syntormon metathesis</i> (Loew, 1850)	S	0,14	5	1	6
69 <i>Syntormon monilis</i> (Haliday, 1851)	P, HCW	0,32	11	3	14
70 <i>Syntormon pallipes</i> (Fabricius, 1794)	S, P, FL, RB, DDW, MDW, HMW, HCW, CD, LR, HGR, GRL, HHL, MHL	44,34	975	942	1917
71 <i>Syntormon pumilis</i> (Meigen, 1824)	RB, HGR	0,42	11	7	18
72 <i>Syntormon subinermis</i> (Loew, 1869)	S, RB, HGR	0,88	28	10	38
73 <i>Syntormon zelleri</i> (Loew, 1850)	S, P	0,21	5	4	9
74 <i>Telmaturdus tumidulus</i> (Raddatz, 1873)	RB	0,21	3	6	9
75 <i>Teuchophorus bisetus</i> Loew, 1871	RB	0,46	20	-	20
76 <i>Teuchophorus chaetifemoratus</i> Pollet & Kechev, 2007	P, HCW	0,09	4	-	4
Subfamily Xanthochlorinae Aldrich, 1905					
77 <i>Xanthochlorus tenellus</i> (Wiedemann, 1817)	HGR	0,05	2	-	2

The vast majority of species in the research area prefer moist and shaded habitats such as fenlands, reedbeds, humid coniferous woodland and humid grassland, depending on habitat preference. On the other hand, *H. gracilis*, *P. regalis*, *H. balticus*, *C. curvipes*, *C. umbripennis* and *S. pallipes* were found to be eurytopic species in our investigations. They were found to prefer different habitat types compared to other ecological studies. *C. curvipes*, *S. pulicarius*, *X. tenellus* and *S. pallipes* are eurytopic species according to Pollet & Grootaert (1991), Pollet & De Bruyn (2000); Pollet & Grootaert (1987) and Küçükberber *et al.*, (2017). Ecological data on the species were given by some authors in their studies, as follow; *A. vestita*, *D. excisus* – reedbeds (Pollet & De Bruyn, 2000); *D. nubilus*, *D. latilimbatus*, *C. pulchellus* – mostly streams (Pollet *et al.*, 1988; Pollet *et al.*, 1989); *H. chetifer* – moderately mixed woodland and humid coniferous woodland; *H. gracilis* – coastal dunes (Pollet & Grootaert, 1994); *P. chrysozygos* – streams (Pollet *et al.*, 1989), moderately humid mixed woodlands (Pollet & Grootaert, 1987); *D. signifer* – moderately mixed woodland, fenlands and humid grassland; *S. lorifera* – scrub, woodland, meadow; *Hydrophorus balticus* – humid grassland, humid mixed woodland, humid coniferous woodland; *Liancalus virens* – humid grassland; *R. brevicorne* – humid mixed woodland; *C. umbripennis* – humid coniferous woodland, dry coniferous woodland, fenlands, grassland; *S. zelleri* – dry coniferous woodland (Küçükberber *et al.*, 2017); *R. appendiculatum* – fenlands, humid grassland, humid coniferous woodland (Pollet *et al.*, 1989; Küçükberber *et al.*, 2017); *R. caliginosum* and *S. denticulatus* – dry deciduous woodland, aquatic and semiaquatic habitats, moderately mixed woodland, grassland, dry coniferous woodland, willow groves (Pollet & Grootaert, 1987; Pollet *et al.*, 1989; Küçükberber *et al.*, 2017); *R. laticorne* – aquatic and semiaquatic habitats (Pollet *et al.*, 1989); *R. micans* – dry deciduous woodland, fenlands (Pollet *et al.*, 1989); *S. pulicarius* – humid coniferous woodland (Pollet & Grootaert, 1987), fenland (Pollet, 1992; Pollet, 2000); *S. pallipes* – fenland, grassland, humid coniferous woodland (Pollet *et al.*, 1989; Pollet ve Grootaert, 1991; Pollet, 1992a); *X. tenellus* – dry deciduous woodland (Pollet *et al.*, 1989; Meuffels *et al.*, 1989), grassland, heathland, humid coniferous

woodland (Meuffels & Pollet, 1997). The above ecological data is largely consistent with the data of our investigation. Climatic factors are most likely the main reason for the small discrepancy.

Some of these were caught in remarkably high numbers, such as *S. pallipes*, *Poecilobothrus regalis*, *H. balticus*, which accounted for 44.34%, 11.50% and 11.06%, respectively, of the total number of specimens collected. On the other hand, a total of 31 species were found with less than 5 specimens.

According to the classification of Krebs (2004), five species groups were found: eudominant – *S. pallipes* (44.34%), *H. balticus* (11.06%) and *P. regalis* (11.50%); dominant – *C. umbripennis* (5.34%) and *S. pulicarius* (6.75%); subdominant – *H. gracilis* (2.84%); recedent – *D. signifer* (2.50%) and *C. curvipes* (1.73%); subrecedent – <1% (70 species) (Table I).

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References

- FAO. 2019. Türkiye'nin Biyoçeşitliliği: Genetik Kaynakların Sürdürülebilir Tarım ve Gıda Sistemlerine Katkısı. Ankara. 222 s. Licence: CC BY-NC-SA 3.0 IGO.
- Gelbiç, I., & Olejníček, J., (2011). Ecology of Dolichopodidae (Diptera) in a wetland habitat and their potential role as bioindicators. *Central European Journal of Biology*, 6(1), 118-129.
- Grihanov, I. Ya., & Brooks S. E. (2017). 14. Dolichopodidae (long legged flies). In Kirk-Spriggs, A. H., & Sinclair, B. J. (Eds.) *Manual of Afrotropical Diptera. Volume 2. Nematocerous Diptera and lower Brachycera*. Suricata 5. South African National Biodiversity Institute, Pretoria, 1265-1320.
- Kazerani, F., Khaghaninia, S., & Grihanov, I. Ya. (2011). Diversity of the genus *Dolichopus* Latreille in three different habitats of East Azerbaijan Province, with new records for Iran. *Arxius de Miscel-lània Zoològica*, 11, 134-152.
- Kechev, M. (2021). Diversity of long-legged flies (Diptera, Dolichopodidae) of the Balkan Mountains (Bulgaria and Serbia). *Historia Naturalis Bulgarica*, 42, 15-24.
- Krebs, C. J. (1994). *Ecology: the experimental analysis of distribution and abundance*. Addison-Wesley Educational Publishers, UK. 816 pp.
- Küçükberber, M., Tonguç, A., & Koç H. (2017). Dolichopodidae (Diptera) fauna of Spil Mountain with four new records. *Türkiye Entomoloji Bülteni*, 7(1), 23-29.
- Meuffels, H. J. G., Pollet, M., & Grootaert, P. (1989). The dolichopodid fauna (Dolichopodidae, Diptera) of a garden habitat: faunistics, habitat preference, phenology and distribution. *Entomologie*, 58, 83-94.
- Pollet, M., & Grootaert, P., (1987). Ecological data on Dolichopodidae (Diptera) from a woodland ecosystem. I. Colour preference, detailed distribution and comparison between different sampling techniques. *Bulletin de l'Institut royal des Sciences naturelles de Belgique, Entomologie*, 57, 173-186.
- Pollet, M., Meuffels, H., Mercken, H., & Desender, K., (1988). Faunistic Data on the Dolichopodid Fauna (Dolichopodidae, Diptera) of some habitats in the famenne (Prov. Namur, Belgium). *Bioogy Jb Dodonaea*, 56, 50-61.
- Pollet, M., Grootaert, P., & Meuffels, H., (1989). Relationships between habitat preference and distribution of dolichopodid flies in landers (Dipt., Dolichopodidae). *Comptes rendus du symposium Invertébrésde Belgique*, 25-26 November 1989, Bruxelles, Belgium, 363-371.

- Pollet, M., & Grootaert, P., (1991). Horizontal and vertical distribution of Dolichopodidae (Diptera) in a woodland ecosystem. *Journal of Natural History*, 25, 1297-1312.
- Pollet, M., (1992). Reedmarshes: a poorly appreciated habitat for Dolichopodidae. *Dipterists Digest*, 12, 23-26.
- Pollet, M., & Grootaert, P., (1994). The dolichopodid fauna of coastal habitats in Belgium (Dolichopodidae, Diptera). *Bulletin et Annales de la Société royale belge d'Entomologie*, 130, 331-344.
- Pollet, M., (2000). *A documented Red List of the dolichopodid flies (Diptera: Dolichopodidae) of Flanders*. Communications of the Institute of Nature Conservation 8, Brussels, 190 pp.
- Pollet, M., & De Bruyn, L., (2000). An exercise in characterizing a habitat on the basis of its dolichopodid community (Dolichopodidae, Diptera). *Bulletin de la Société royale de Belgique d'Entomologie*, 136, 185-191.
- Tonguç, A., & Barlas, M., (2011). First record of Xanthochlorinae and new records of Dolichopodinae in the Turkish Dolichopodidae (Diptera) Fauna. *Journal of Entomological Research Society*, 13, 117-121.
- Vincent, P. T. (2013). The habitat affinities of the Dolichopodidae (Diptera) found at Walberswick National Nature Reserve (Suffolk) and their importance as bioindicators. *Dipterists Digest*, 20, 161-176.

АФИНИТЕТ СТАНИШТА И АБУНДАНТНОСТ ВРСТА ФАМИЛИЈЕ DOLICHOPODIDAE (DIPTERA) НА ТЕРИТОРИЈИ ЗАПАДНЕ АНАТОЛИЈЕ

АЛПЕР ТОНГУЧ

Извод

У овој студији је анализиран афинитет према станишту и бројност врста фамилије Dolichopodidae у западној Анатолији (Афионкарахисар, Кутахја и Ушак). Јединке су сакупљане помоћу ентомолошке мреже у периоду од 2009. до 2011. године. Укупно је сакупљено 4 327 односно 77 врста. Већина идентификованих врста на истраживаној територији преферира влажна и засењена станишта као што су мочваре, тршћази, влажне четинарске шуме и влажне ливаде. Скоро 45 % од укупног броја сакупљених примерака припадало је једној врсти (*Syntormon pallipes*), а бројне су биле и врсте *Hydrophorus balticus* и *Poecilobothrus regalis*.

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