Journal of Animal and Veterinary Advances 9 (16): 2163-2166, 2010
ISSN: 1680-5593

Chironomidae (Diptera-Insecta) Fauna of TMI 12 Pond (Elazig-Turkey)

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Abstract: Bottom samples were collected monthly between September 2005 and November 2006 from 3 stations in order to determine Chironomidae larva and their seasonal distributions in TMI 12 Pond. During the study period 14 species belonging to 2 subfamily of Chironomidae were recorded. *Chironomus plumosus* was determined as the dominant species. *Chironomus plumosus*, *Chironomus thummi*, *Chironomus anthracinus* and *Chironomus tentans* were present in all stations. The most numbers of larvae were recorded in winter, the least were recorded in spring months. Also spring was recorded as the poorest season as to Shannon-Wiener species diversity index values. The other seasons index results were showed similarities with each other.

Key words: Chironomidae larvae, seasonal distribution, biological diversity index, TMI 12 Pond, spring, Turkey

INTRODUCTION

Larval chironomidae species are important as food items for fish and other aquatic organisms. Since they contain important nutrient elements in high proportions especially proteins and are easily digestible, they are an indispensable source of food for fish. Further more, they prevent putrefaction on the floor for photosynthesis, thereby affecting the material cycle in a position way. They are also important as indicator organisms, i.e., the presence, absence or quantities of various species in a given body of water can indicate whether pollutants may be present.

Their fossils are also widely used by palaeolimnologists as indicators of past environmental changes including past climatic changes (Walker, 2001). Some of researches on Chironomid in Turkey were conducted by Sahin and Baysal (1972), Koirgiz (1988), Sahin (1980, 1987a, b), Gozler and Sen (1993), Ozkan (2006a, b, 2007), Ozkan and Kirgiz (1995), Ozdemir and Sen (1991), Ustaoglu *et al*. (2005). In this study, it has been aimed to contribute to Turkey's Chironomidae fauna by the identification of the samples of TMI 12 Pond.

MATERIALS AND METHODS

TMI 12 pond is 22 km from faraway from Elazig and 100 km away from Diyarbakir city center and located between Elazig-Diyarbakir highway (22 km) Pond is connected with a small natural channel with right next to Hazar Lake that is located nearby the pond. The ground of pond is muddy and completely covered with water plants. Benthos specimens were collected monthly with Ekman Grab from three stations that thought to be characterized the features of pond between September 2005- November 2006 from TMI 12 Pond (Elazig). Samples could not be taken due to bad weather conditions in january. Samples of mud taken were cleaned in pans whose meshes are in different size and collected larvae were put into 250 mL plastic bottles containing 70% alcohol. Firstly temporary and then permanent preparations were done by Sahin and Ozkan methods. During this treatment firstly head capsules were boiled in 10% KOH for 5-15 min for removing waste tissues. Then they were taken to 80-90-100% alcohol series for 10 min each and were kept in xylene for 1-2 min and closed with entellan. Species determination was done under microscope marked Nikon (Cranston, 1982; Sahin, 1980; Epler, 1995). During all study periods, water temperature, disolved oxygen and pH were measured *in situ* by using digital Oxi 315i/SET Oxygen meter and Lamotte (pH 5-WC) pH meter.

To eludicate the Chironomidae fauna structure, dominance index, Shannon Weaver Diversity Index, Sorenson Similarity Index, Margalef Species Richness Index were used. Formulas were used to calculate the indexes:

$$\text{Dominance } D = (N_A/N_n)\times 100$$

Shannon weaver:

$$H^i = -\sum_{i=1}^{s} p_i \ln p_i$$

Sorenson similarity index:

$$Q/S = 2j/a + b$$

Margalef species richness index:

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$$D = S - 1/\text{Log } N$$

RESULTS AND DISCUSSION

During the investigation period between September 2005 and November 2006 in TMI 12 Pond, 11 genus and 14 species belonging to 2 subfamilies Tanypodinae (25.58%) and Chironominae (71.42%) of Chironomideae family were identified. In all stations water temperature, dissolved oxygen and pH were measured in situ and values of all station were shown in Fig. 1.

Chironomid species of TMI 12 Pond identified from 3 stations (Table 1), their distributions with respect to time and stations were shown in (Table 2). Monthly individul number in m^2 of Chironomidae larva were calculated and shown in Fig. 2.

Totaly 8 species in station I, 13 species in station II and 4 species in station III were identifed (Table 1). The most larvae were determined in station I in October (1209 ind. m^2), in station II in March (289 ind. m^2), in station III in July (255 ind. m^2). The least larvae were determined in station I in march (44 ind. m^2), in station II in april, june and july (44 ind. m^2), in station III in may. (44 ind. m^2) (Fig. 2).

According to Sorenson similarity index results, a similarity as to species number between I-II and I-III stations with a value of 66.6% and a similarity between II-III stations 47.05% could be reported Shannon-Wiener index values were calculated as in station I in autumn (1.3807) (Table 3), in winter (1.0725) (Table 4) in spring (0) (Table 5) and in summer (0.9514) (Table 6), Spring has been recorded as the poorest season as to species diversity.

The other seasons index results were showed similarities. In station II, index values were calculated as in autumn (1.5118) (Table 3), in winter (1.4159) (Table 4), in spring (1.3906) (Table 5) and in summer (1.4891) (Table 6). No important difference as to species diversity was recorded in this season In station III, in index values were calculated as in spring (0) (Table 5), summer (0.9511) (Table 6).

No larva was recorded in other seasons. A little difference between station I and II could be observed when three stations were compared. Station III was the poorest area as to species diversity. In TMI 12 Pond 14 species belonging to Chironomidae were recorded. Among the species collected, *C. plumosus*,

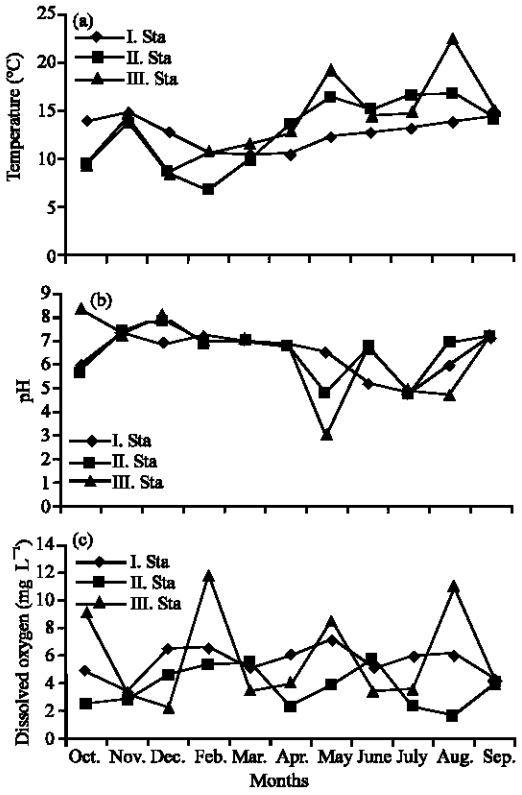

Fig. 1: Water temperature, disolved oxygen and pH value in TMI 12 pond

Table 1: Distrubution of chironomidae larvae according to stations in TMI 12 Pond

Species	1	2	3
Chironomus plumosus (Linneaus, 1758)	+	+	+
Chironomus thummi (Kieffer, 1911)	+	+	+
Chironomus anthracinus (Zettestedt, 1860)	+	+	+
Chironomus (*Camprochironomus*) *tentans* (Fabr., 1794)	+	+	+
Stictochironomus longipugionis (Sahin, 1987)	+	-	-
Paradentipes albimanus (Meigen, 1818)	-	+	-
Polypedilum nubeculosum (Meigen, 1804)	+	+	-
Cryptocladopelma laccophila (Kieffer, 1911)	-	+	-
Dicrodentipes tritomus (Kieffer, 1916)	-	+	-
Micropsectra notescens (Walker, 1856)	+	+	-
Procladius (*Holotanypus*) sp.	+	+	-
Zavrelimya sp.	-	+	-
Psectrotanypus varius (Fabr., 1787)	-	+	-
Clinotanypus pinguis (Loew, 1861)	-	+	-

Table 2: Monthly distrubution of chironomidae larvae in TMI 12 Pond

Chronomidaee larvae	O	N	D	J	F	M	A	M	J	J	A	S
C. plumosus	+	+	+	x	+	-	-	+	+	+	+	+
C. thummi	+	+	+	x	+	-	-	-	-	+	+	+
C. anthracinus	+	+	+	x	+	-	-	+	-	+	+	+
C. tentans	+	+	+	x	-	-	-	-	-	+	+	+
S. longipugionis	-	-	+	x	-	-	-	-	-	-	-	-
P. albimanus	-	-	-	x	-	-	+	-	-	-	-	-
P. nubeculosum	-	+	+	x	-	-	-	-	-	-	-	-
C. laccophila	-	-	-	x	-	-	+	-	-	-	-	-
D. tritomus	-	-	-	x	-	-	-	-	-	+	-	-
M. notescens	+	-	+	x	+	+	-	+	+	+	-	-
P. sp.	+	-	+	x	+	+	-	+	-	-	-	-
Z. sp.	+	-	-	x	-	-	-	-	-	-	-	-
P. varius	-	-	+	x	-	-	-	-	-	-	-	-
C. pinguis	+	-	-	x	-	+	+	-	-	-	-	-

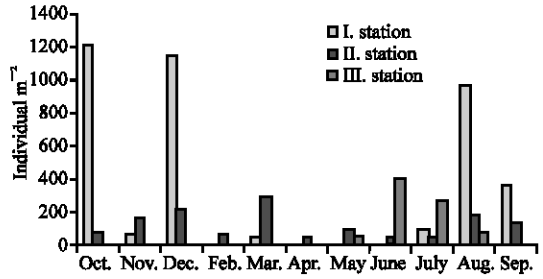

Fig. 2: Monthly Individual numbers of Chironomidae larvae in TMI 12 Pond

C. thummi, *C. anthracinus*, *C. tentans* were recorded in all stations (Table 1). The highest number of species was observed at station II with 13 species, followed by station I with 8 species *D. tritomus*, *S. longipungionis*, *Z.* sp., *P. albimanus*, *P. varius* and *C. laccophila* were observed only in one sampling period (Table 2).

Some of the identified species as *Procladius* sp., *C. thummi*, *C. tettans* were also recorded by Sen and Ozdemir in Haringet Stream, Akil, in Cip Dam lake, in Buyuk Stream. *C. thummi* and *C. tentans* which were found in high amounts in research area were mostly found in the low-stream and stagnant-water in muddy base among fallen leaves, water plants and algae (Sahin) TMI Pond also showed these qualities and these two species were recorded as dominant species.

Sahin and Baysal (1972) and Tellioglu observed *C. thummi*, *C. tentans* in high numbers in Hazar lake located nearby the study area. In both studies an increase in Chironomid larvae individual numbers were observed in spring as recorded in TMI 12 Pond.

Tasdemir *et al.* (2008) were recorded *C. plumosus* and C. *anthracinus* in high numbers during sampling periods in Gediz Delta and indicated that these species had got a wide tolerance and shows cosmopolite distribution. In Cip Dam lake (Elazig), Akil recorded 17 Chironomidea species. Among these species, *Procladius* (*Holotanypus*) sp., *Chironomus thummi*, *Chironomus tentans*, *Chironomus anthracinus*, *Polypedilum nubeculosum* and *Stictochironomus longipugionionis* were also determined in TMI 12 Pond.

Table 3: Ecological indexes values in TMI 12 Pond in Autumn (N: Species numbers, S: Individual numbers, D: Margalef Index, Pi*Ln (Pi): Shannon-Weiner Index)

Stations	S	N	D	Ln (Pi)
I.	2430	5	1.1	-1.3807
II.	488	8	2.6	-1.5118
III.	-	-	-	-

Table 4: Ecological indexes values in TMI 12 Pond in winter (N: Species numbers, S: Individual numbers, D: Margalef Index, Pi*Ln (Pi): Shannon-Weiner Index)

Stations	S	N	D	Ln (Pi)
I.	3051	8	2.00	-1.0725
II.	937	7	2.01	-1.4159
III.	-	-	-	-

Table 5: Ecological indexes values in TMI 12 Pond in spring (N: Species numbers, S: Individual numbers, D: Margalef Index, Pi*Ln (Pi): Shannon-Weiner Index)

Stations	S	N	D	Ln (Pi)
I.	15	1	0.00	0.0000
II.	356	7	2.35	-1.3906
III.	15	1	0.00	0.0000

Table 6: Ecological indexes values in TMI 12 Pond in summer (N: Species numbers, S: Individual numbers, D: Margalef Index, Pi*Ln (Pi): Shannon-Weiner Index)

Stations	S	N	D	Ln (Pi)
I.	1316	4	0.96	-0.9514
II.	267	5	1.64	-1.4891
III.	504	4	1.11	-0.9511

Gozler and Sen (1993), reported *C. thummi* from Cip Fish Breeding Center as the most present species in all stations. This species was also present in all stations of TMI 12 Pond. Kara identified 19 Chironomidae species in Buyuk Stream (Pelte-Elazig). About 6 of them (*Chironomus thummi*, *Chironomus anthracinus*, *Chironomus tentans*, *Paratendipes albimanus*, *Psectrotanypus varius* and *Procladius* (*Holotanypus*)

sp.) were also recorded in TMI 12 Pond. Tellioglu investigated Hazar Lake's zoobenthos that is located nearby TMI 12 Pond. About 10 Chironomid larvae were recorded in the lake. Among the identified species *Procladius* sp., *C. plumosus* and *C. thummi* were also recorded inTMI 12 Pond.

In Hazar lake *C. plumosus* were recorded in all months. This species is one of the dominant larvae in TMI 12 Pond.

CONCLUSION

According to Sorenson similarity index results, similarities could be observed as to species number, between I-II and I-III stations with a value of 66.6% and between II-III stations with 47.05%. As there has been no research conducted at TMI 12 Chironomidae larvae before, all of the identified species are new records for TMI 12 Pond.

ACKNOWLEDGEMENTS

Researchers would like to thank to Asst. Prof. Dr. Ayda Tellioglu for helping us with the identifications and Firat University Scientific Research Project FUBAB for their financial support (Project No 1336).

REFERENCES

Cranston, P.S., 1982. A key to the larva of the british orthocladiinae (Chironomidae). Freshwater Biol. Assoc., 45: 152-152.

Epler, J.H., 1995. Identification Manual for the Larval Chironomidae (Diptera) of Florida State of Florida. Florida State University, Tallahassee, pp: 110.

Gozler, A.M. and D. Sen, 1993. Chironomidae (Dioptera) larvae and their seasonal distribution in cip fish rearing unit. Ege Univ. Su Urunieri Derg., 9: 170-177.

Koirgiz, T., 1988. A morphological and ecoiogicai study on chironomidae (Diptera) larvae of seyhan Dam Lake. Doga T. Zool. Derg., 12: 246-255.

Ozdemir, Y. and D. Sen, 1991. Keban Baraj golu ova bolgesinde bulunan procladius (*Holotanypus*) sp. ve chironomus halophilus larvalarinin mevsimsel dagilimlari. Ege Univ. Su Urunieri Yuksekokulu Su Urunieri Derg., 8: 60-65.

Ozkan, N. and T. Kirgiz, 1995. Chironomidae (Diptera) larva and their distribution in edirne. Turk. J. Zool., 193: 51-58.

Ozkan, N., 2006a. ChironomId (Chironomidae; Diptera) fauna of trakya district (Kirkiareli, Tekirdag, Istanbul ve Canakkale). Ege Univ. Su Urunieri Derg., 23: 125-132.

Ozkan, N., 2006b. ChironomIdae (Chironomidae; Diptera) fauna of gokceada. G. U. J. Sci., 19: 69-75.

Ozkan, N., 2007. Chironomidae (Diptera) larva and their distribution in canakkale. Trakya Univ. J. Sci., 8: 123-132.

Sahin, Y. and A. Baysal, 1972. Benthic Fauna of Hazar Lake and its Distribution. Hidrobiyoloji, Istanbul.

Sahin, Y., 1980. Determination of limnofauna and taxonomic features of chironomidae (Diptera) of elazig and adjacent cities. Firat Univ. Veteriner Fakultesi Dergisi, 5: 180-182.

Sahin, Y., 1987a. Chironomidae (Diptera) larvae of burdur, beysehir and salda lakes. Doga Turk. Zooloji Derg., 11: 59-70.

Sahin, Y., 1987b. Chironomidae (Diptera) larvae of egridir lake. Doga Turk. Zool. Derg., 11: 60-66.

Tasdemir, A., R. Ustaoglu and S. Balik, 2008. Contribution on chironomidae (Diptera) fauna of gediz deltasi (Menemen-Izmir). J. Fish. Sci., 3: 32-39.

Ustaoglu, M.R., S. Balik and A. Tasdemir, 2005. ChironomIdae (Diptera-Insecta) fauna of gumuldur stream (Izmir). Turk. J. Zool., 29: 269-274.

Walker, I.R., 2001. MIdges: ChIronomidae and Related Diptera. In: Tracking Environmental Change Using Lake Sediments, Smol, J.P., H.J.B. Birks and W.M. Last (Eds.). Vol. 4, Kluwer Academic Publishers, Dordrecht, pp: 43-66.