

Research Article

Copepoda abundance and diversity in the Saleh River, a tributary of the Euphrates River in the Northern Basrah

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Abstract

This study was conducted to determine the seasonal changes in Copepoda species in the Saleh River. Monthly sampling was done in four stations in the Saleh River using a 55µm plankton net from January to December 2020. Based on the results, a total of 12 taxa of Copepoda were recorded that Copepoda was most abundant group during the spring. Nauplii of Copepoda and larvae of *Cyclops* were the predominant species. The total number of Copepoda ranged between 54ind/m³ in the summer and 504ind/m³ in the spring.

Keywords: Radish, Genetic improvement, Soil mulching.

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Introduction

Copepods, a subclass of the class Hexanauplia, can be found in freshwater and saltwater habitats (Akbar & Ali 2020). Some species are planktonic, others are benthic, and several have parasitic phases (Nazari et al. 2020). Copepods are used as biodiversity indicators in ecological studies (Al-Haidarey & Jabbar 2020). Phytoplanktons are the main food source for most copepods (Shao & Zeng, 2020). Their eggs hatch into nauplius having a head, small tail, but no thorax or true abdomen (Svetlichny & Kirboe 2020).

The Saleh River is located northwest of Basra in the Al-Midaina District. It is a tributary of the Euphrates River used for irrigation of agricultural lands and fishing. In Iraq's rivers, Majeed et al. (2021) reported the nauplii of Copepoda as the dominant group (more than 70%) in the Tigris River. Copepoda made up about 3% of the total zooplankton in the Lesser Zab River in Iraq (Rzgar 2021). In this regard, this study was conducted to investigate the seasonal changes in qualitative and quantitative of

Copepoda in the Saleh River.

Materials and methods

This study was carried out from January 2020 to December 2020. Samples were taken monthly from five stations on the Saleh River (Fig. 1). Sampling was done at the bank of the river at a distance of 2 meters. The water was filtered through the plankton net at a rate of 60 liters per minute with a mesh of 55µm. The samples were preserved in 4% formalin. Then, they were transported to the laboratory for isolation, counting, and identification (Robert, 2003). Samples were transported to a laboratory, where original samples of 250 ml were homogeneously mixed and three sub-samples were investigated. A pipette was used to take one mL of sub-sample. Then, it is poured into a counting cell, counted, and examined under a microscope, resulting in the identification and counting of individuals as the number of individuals per cubic meter (ind/m³). Copepods were identified according to the available standard keys (Jordi 2000; Thorp 2010).

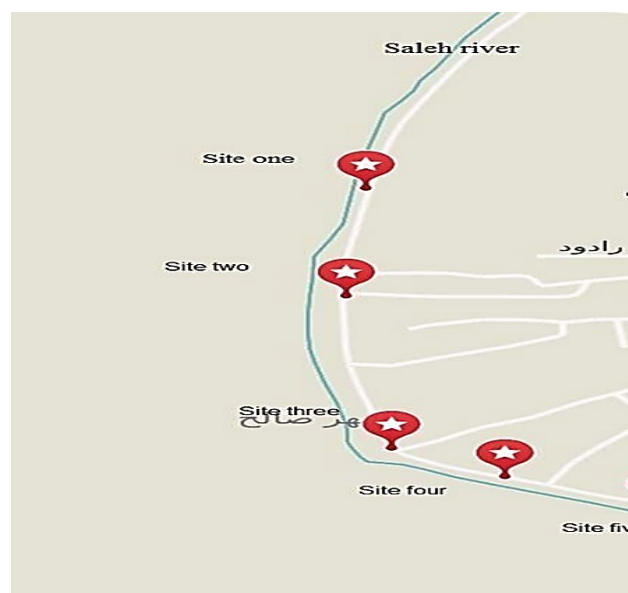


Fig.1. Sampling stations in Saleh River.

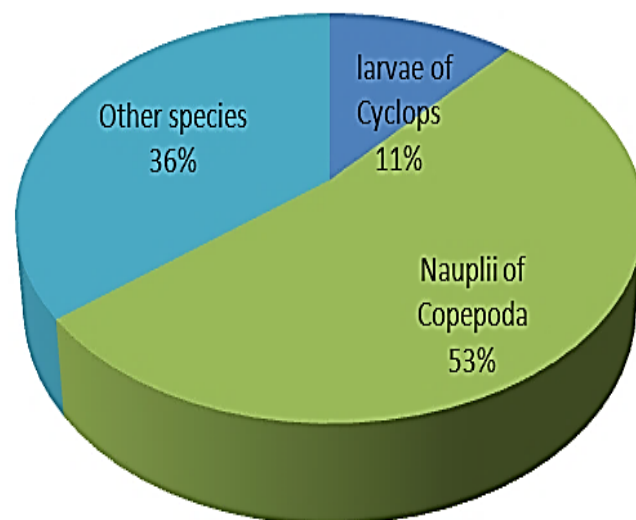


Fig.2. The percentage of Copepoda species in the Saleh River during the study period.

Table 1. The number of Copepoda species (ind/m³) in samples collected from the Saleh River during the study period.

Group	Species	S1	S2	S3	S4	Total
Copepoda	<i>Acartia pacifica</i>	5	3	6	2	16
	<i>Acrocalanus gibber</i>	8	7	10	3	28
	<i>Calanoid</i>	-	-	2	-	2
	<i>Cyclops viridis</i>	1	2	5	1	9
	<i>Cyclops navus</i>	1	2	4	-	7
	<i>Eucyclops agalis</i>	6	5	9	3	23
	<i>Macrocyclus ater</i>	13	10	22	5	50
	<i>Paracyclops affinis</i>	18	11	20	7	56
	Immature <i>Harpacticoida</i>	22	19	29	6	76
	larvae of <i>Cyclops</i>	31	25	36	11	103
	Nauplii of Copepoda	110	102	203	56	471
	<i>Tropocyclops prainus</i>	15	11	19	5	50
Total		230	197	365	99	891

We used the Complete Randomized Design (CRD) design with two factors, including the five sites first one and four seasons as the second factor, using three replicates, and the least significant difference (LSD) test at the 0.05 level.

Results and Discussion

The copepod density during the study period ranged from 7-178ind/m³. At the fourth site, the lowest value was recorded in the summer and the highest was found in the spring at the third station (Fig. 2). A total of 12 taxa were identified and cyclops larvae

consists 11% of larvae, while others were 36%. The genus *Cyclops* had two species (Table 1). Station one had the lowest density of Copepoda in the summer as 10ind/m³, and the highest density was in the spring with 170ind/m³. At station two, the lowest density was recorded in summer as 17ind/m³, while in spring the highest density was 96ind/m³. At station three, the Copepoda density was 109ind/m³ in the summer and the lowest density of Copepoda in summer reached to 20ind/m³. However, in this station, a higher density was recorded in the spring with 178ind/m³. Station four had a density of 7ind/m³ in

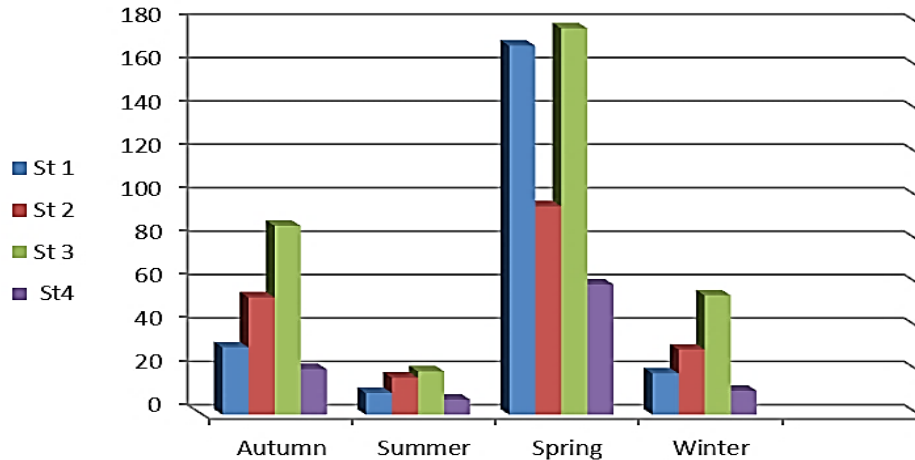


Fig.3. The seasonal variation in Copepoda density (ind/m³) in the Saleh River during study period.

the summer and 60ind/m³ in the spring.

Based on the results, the Copepoda density varied with the season and study sites. The highest densities were recorded during spring (Fig. 3). This may be due to favorable environmental conditions such as temperature and food availability i.e. phytoplankton, bacteria, or detritus in this season (Dhanpathi 2000). In summer, densities were lower as a result of increasing water temperature. The results also showed a correlation between Copepoda density and temperature (Erdugan & Guher 2005). Based on the results, site 3 had the highest densities of copepods in the spring and nauplii of Copepoda and larvae of Cyclops were predominant as observed in most Iraqi water bodies (Ezekiel et al. 2011). Our results do not agree with the findings of Nashaat (2010) and Abdulwahab (2015) who found that Copepoda density in the Tigris River increased during autumn and lower in winter. The Copepoda density in this study was lower than that reported by Ajeel (2016) who indicated that its density ranged 4.7-68963ind/m³ in the Shatt Al-Arab River. Our results are in agreement with the findings of Majeed's (2021) that showed nauplii had the highest ratio, followed by immature Cyclops.

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