



Rotifers community structure and abundance along Shatt Al-Arab River from Garmmat Ali to Al- Fao, Southern Iraq.

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Abstract

The Rotifers community along Shatt Al-Arab River was investigated during four seasons of 2006. 49 species belonging to 27 genera recorded. The genus *Brachionus* the highest number of species (7) following by *Monostyla* and *Trichocerca* 4 each constituted and *Keratella* (3) species..

In general *Brachionus calyciflorus* and *Keraktella valga* were most frequent and dominant species. Within the five investigated sites, Al- Karoon station was characterized by highest rotifers density(369 ind./l) and Abu Al-Khaseeb station showed the less density (230 ind. / l). However, summer was the period of highest densities. Diversity Indices for the five studied stations were calculated, the value ranged between 1.43 – 1.61 for Shannon – Weaver index, 6.29 – 8.47 for richness index, and between 0.51 – 0.55 for uniformity index.

1- Introduction

Rotifer are from zooplankton group, usually of microscopic size 30 – 2000 um, distributed widely in different freshwater (Kutikova, 2002). The most species measure about 250 um (Pontin, 1978). There are three basic groups of rotifera: the Marine

Seisonidea, the freshwater Bdelloidea and Monogononta (Kutikova , 2002). In the food chain of fresh water bodies rotifers are of special importance because it is an important link between the Phytoplankton and carnivores Zooplankton (Mageed, 1998). Nearly all plankton rotifers are herbivores,

feeding on algae, ingesting cells 4-17 micron in size (Gilbert, 1985) The important of this animals coming from using very widely in aquaculture for feeding fish and shrimp specially larvae stages. There are several rather complete surveys of rotifera composition from different region, for Africa (Green, 1994) for Amazonia (Robertson et al., 1984) for central America (Collado *et al.*, 1984).

In spite of the fact that the Shatt al- Arab river is one of the most important rivers in Iraq, few studies were made on species composition of plankton rotifers (Al-Saboonchi *et al.*, 1986 ; Sabri, 1988; Abdul-Hussein *et al.*, 1989 ; Ali and Abdullah 1999 ; Ghazi and Ahmed, 2008 and Ahmed and Ghazi, 2009).

2- Materials and Methods:

The study based on 60 samples collected during four seasons 2006. These samples were taken from five stations in Shatt Al-Arab River at Garmmat Ali, Abu Al-Khaseeb, Al- Karoon, Al- Seeba and Al-Fao. Samples were collected by standard plankton net of 53 micron mesh size (mouth aperture of 40 cm diameter). Sample was fixed by 4 % formalin solution. Compound microscope was used for examination. Identification of was mode following references such as (Edmonson , 1959 ; Pontin, 1978 ; Kutikova , 2002). Shannon weaver index (H) was applied according to

Shannon and Weaver (1949). The species uniformity index (E) was calculated according to Pielao (1977) and species richness index (D) was calculated according to Margalef (1968).

3- Results:-

Species composition:-

Table 1 lists rotifer species collected from Shatt Al- Arab River during 2006 together with their occurrence in the five studied stations. Forty nine species of rotifers belong to 27 genera were recorded. Different genera may represent by one or more the one species. But the genus *Brachionus* was represented by he highest number of species (eight), followed by *Trichocerca* and *Monostyla* (four species). However, the genera *Keratella* was consist of three species, and other genera consists one or two species only.

Abundance:-

The seasonal fluctuations in total density of rotifers in the five studied stations at Shatt Al - Arab River illustrated in Fig (1). Generally density were maximum during summer (R 451 – 797 ; \bar{x} 579), declined slightly in Autumn (R 199 – 637 ; \bar{x} 408), dropping to their lowest values in winter (R 22 – 96 ; \bar{x} 60) therefore, the value slightly increase in spring (R 20 – 204 ; \bar{x} 97) .

On the other had rotifers of Shutt Al-Arab were most abundant in Al- Karoon site

(\bar{x} 369) as the study indicates. But there density values were relatively lower in the two sites located before the meeting of Karoon river with Shatt Al- Arab, i.e. Garmmat Ali and Abu Al - Khaseeb stations (\bar{x} 273 and 230 respectively). However the density recorded the two sites located after the meeting (Al - Seeba and Al- Fao stations, \bar{x} = 268 and 284 respectively), were lower too.

The examination of the samples for the relative species abundance shows that two species, *B.calyciflorus* and *K.valga*, were usually dominated the samples in all the five studied stations (Fig.3). *B.calyciflorus* was composed 38.3 – 73.3 % of the total rotifers, whereas *K.valga* was composed 21.5 – 36.0 % of the total rotifers. Furthermore results reveals that However, that *K. valga* peaked in two seasons Summer and in Winter (Fig.3), whereas *B. calyciflorus* show only one peak in Summer (Fig. 4).

Diversity

Species number and density values were analyses for diversely, indices the time the results appeared highest number of species (42 spp.) in Garmmat Ali station, there were more number of individual in Al-Karoon station (\bar{x} = 369). The number of species and mean density as well as the calculated indices gives in table (1). In general, the Shannon weaver index (H) was higher in Garmmat Ali station 1.16 and lower in Al-Karoon 1.43. The species uniformity index

(E) values ranged between 0.51 in the Garmmat Ali station to 0.55 in the Al- Fao stations. Again highest species richness index (D = 8.47) was calculated at Garmmat Ali station. However, the range of values was 6.29 to 8.47.

4- Discussion:-

Rotifers had been considered a good bioindicator of water characteristics such as organic pollution, sewage, industrial wastes, toxicity, physical factor, eutrophication, salinity and other unknown factors (Sabri, 1988). These characteristics come from the ability of these animals to utilizing particulate organic matter directly as well as the micro-organisms such as algae, bacteria and protozoa (Fernando, 2002).

The main environmental factors affecting river plankters are the water temperature and discharge (Whitton, 1975). Both factors were found to be significantly correlated with rotifer populations in the Shatt Al-Arab River. Summer was found to be the best season for increase in the population density and species number of rotifer at all stations during the present investigation. This period coincided with the maximum water temperature, there is no doubt that temperature an important role in the distribution of rotifers organisms in the water body (Dhert, 1996). In this season the rotifers became more able to movements through the whole water column so that its migration toward top of the surface 1-2m (

Fernando, 2002). The separate of rotifers were occurrence associated with similar diet of the Phytoplankton that found on the surface, as well as with high temperature the rotifer complete its life cycle and production a new generation in short time (Philippe 1996). While the decreasing number of rotifer in the spring which considers as one of the most important food for a new hatchery for fish and shrimp that hatchery in this season (Mageed, 1998).

High densities in the Al-Karoon station, occurred because water masses coming from Iran crossing Al-Karoon River and meeting with Shat Al-Arab River, so that with this high densities occurred lower diversity in species (high densities for *B. calyciflorus* and *K. valga* and lower densities for other rotifer) depended on characters of this water masses, if the water masses similarity in minerals and nutrition that would lead to increasing the densities and decreasing the diversity, but if the water masses different in minerals and nutrition

that would lead to increasing the diversity and decreasing densities, so that water masses in this station similarity to minerals and nutrition occurred to decreasing diversity, the genus *Brachionus* recorded high densities compare other rotifer in other studied (Ghazi and Ahmed, 2008).

Generally, the seasonal fluctuations in the Shannon-Weaver and Uniformity index in five stations are corresponding well with the seasonal changes in abundance of rotifer, this means that these two indices are sensitive to changes in numbers of individuals in the population and community (Fontaneto and Ricci, 2006). According to Wilhm, (1972) who considered that a diversity index between 1 and 3 means a medium pollution and a diversity index > 3 means clear water, so that the surface water of Shut Al- Arab river in the area investigated can be considered as medium pollution water(H range from 1.43 at Al-Karoon to 1.66 at Garmmat Ali station).

Table (1). List of Rotifer recorded from plankton samples of Shatt – al- Arab river during 2006, and its existence (--) absent, (+) present and (++) dominant in the five studied stations.

Species	Garrmt Ali	Abu-Al-Khseeb	Al-Karoon	Al-Seeba	Al-Fao
<i>Ascomorpha</i> sp.	--	--	--	+	--
<i>Asplanchna priodonta</i>	--	--	--	+	--
<i>Asplanchna</i> sp.	++	++	++	+	+
<i>Brachionus angularis</i>	+	+	+	--	+
<i>Brachionus calyciflorus</i>	++	++	++	++	+
<i>Brachionus</i> sp.	--	--	+	--	--
<i>Brachionus plicatilis</i>	+	+	+	+	+
<i>Brachionus quadridentatus</i>	++	++	+	+	+
<i>Brachionus rubens</i>	+	+	+	+	+
<i>Brachionus</i> .sp	+	+	+	+	+
<i>Cephalodella gibba</i>	+	--	--	--	--
<i>Cephalodella</i> sp.	+	+	+	--	--
<i>Colurella adriatica</i>	+	--	--	--	--
<i>Colurella</i> sp.	+	--	+	--	+
<i>Epiphanes</i> sp.	--	--	+	+	+
<i>Euchlains dilatata</i>	+	+	+	--	--
<i>Euchlains</i> sp.	+	+	--	+	+
<i>Filinia</i> sp.	+	+	--	+	+
<i>Gastropus</i> sp.	+	+	+	+	+
<i>Hexarthra</i> sp.	+	+	+	+	+
<i>Horaella</i> sp.	--	--	--	+	--
<i>Keratella cochlearis</i>	+	+	+	+	+
<i>Keratella tropica</i>	+	+	+	+	+
<i>Keratella valga</i>	+	+	++	+	+
<i>Lecana luna</i>	++	+	+	+	+
<i>Lecana lunaris</i>	+	--	--	--	--
<i>Lepadella ovalis</i>	++	--	--	--	+

Species	Garrmt Ali	Abu-Al-Khseeb	Al-Karoon	Al-Seeba	Al-Fao
<i>Lepadella patella</i>	+	--	--	--	--
<i>Macrochaetus sp.</i>	+	--	+	+	+
<i>Manfredium sp.</i>	+	--	--	--	--
<i>Monommata sp.</i>	+	+	--	--	--
<i>Monostyla bulla</i>	+	+	+	+	+
<i>Monostyla closterocerca</i>	+	+	--		+
<i>Monostyla quadridentatus</i>	+	+	--	--	--
<i>Monostyla sp.</i>	+	+	+	+	+
<i>Mytilina sp.</i>	+	+	+	+	+
<i>Notholca sp.</i>	+	+	+	+	+
<i>Platylas patulus</i>	--	--	+	--	--
<i>Platylas sp.</i>	+	--	+	--	+
<i>Polyarthra sp.</i>	+	+	+	+	+
<i>Pompholyx sp.</i>	--	--	--	+	+
<i>Synchaeta sp.</i>	++	++	++	+	+
<i>Testudinella sp.</i>	+	+	+	+	+
<i>Trichocerca sp.</i>	+	+	+	+	+
<i>Trichocerca cylindrica</i>	+	--	--	--	--
<i>Trichocerca elongate</i>	+	--	--	--	--
<i>Trichocerca flagellate</i>	+	+	--	--	--
<i>Trichotera pocillium</i>	+	--	--	--	--
<i>Trichotera tetractis</i>	+	+	+	+	+

Table (2) Biodiversity indices of Rotifers Shannon-weaver index (H), Species richness Index (D) and Species uniformity index (E) in different Sites of Shatt Al-Arab River during the period 2006 .

Location	No. of species	H	D	E
Garmmat Ali	42	1.61	8.47	0.51
Abu –Al-Khaseeb	30	1.49	6.29	0.52
Al-Karoon	30	1.43	6.38	0.54
Al- Seeba	29	1.54	6.9	0.55
Al-Fao	31	1.55	6.66	0.55

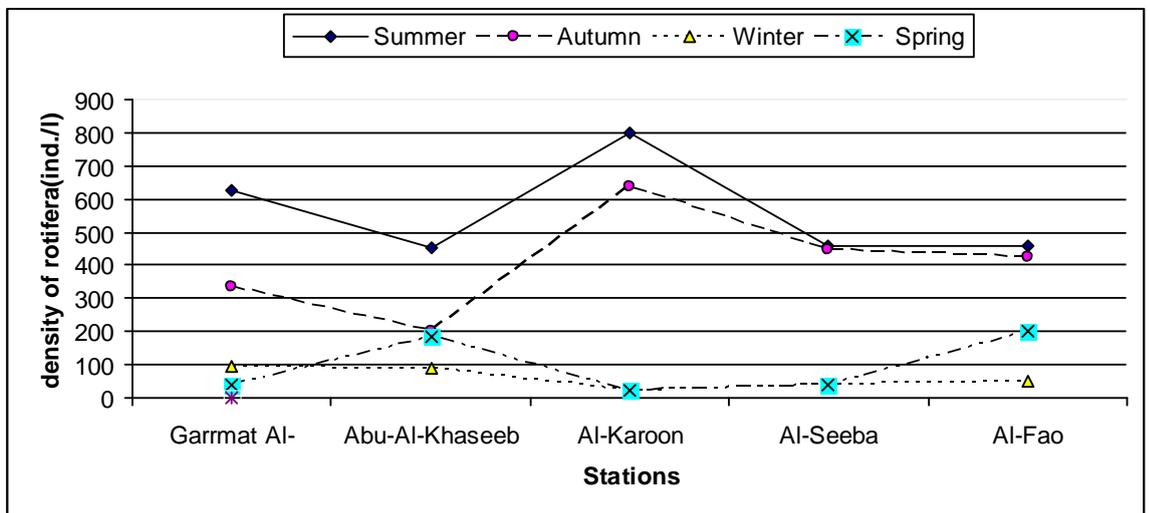


Fig. (1) Total density of rotifers (ind./ l) in different sites of Shatt Al- Arab river during the four seasons from 2006.

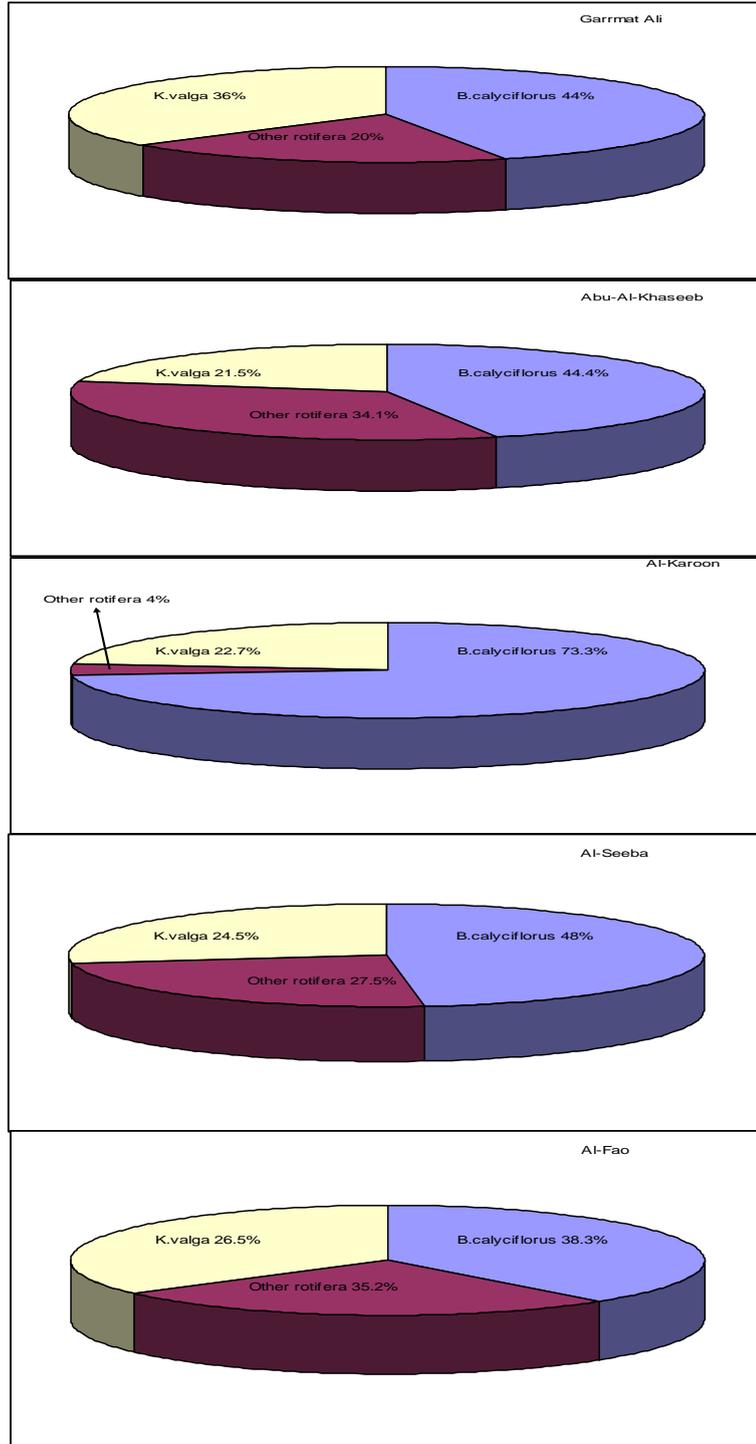


Fig. (2). The relative abundance (per centages) occurrence of *B. calyciflorus* and *K. valga* to the total rotifera numbers in the samples collected from five stations of Shatt al-Arab river during 2006.

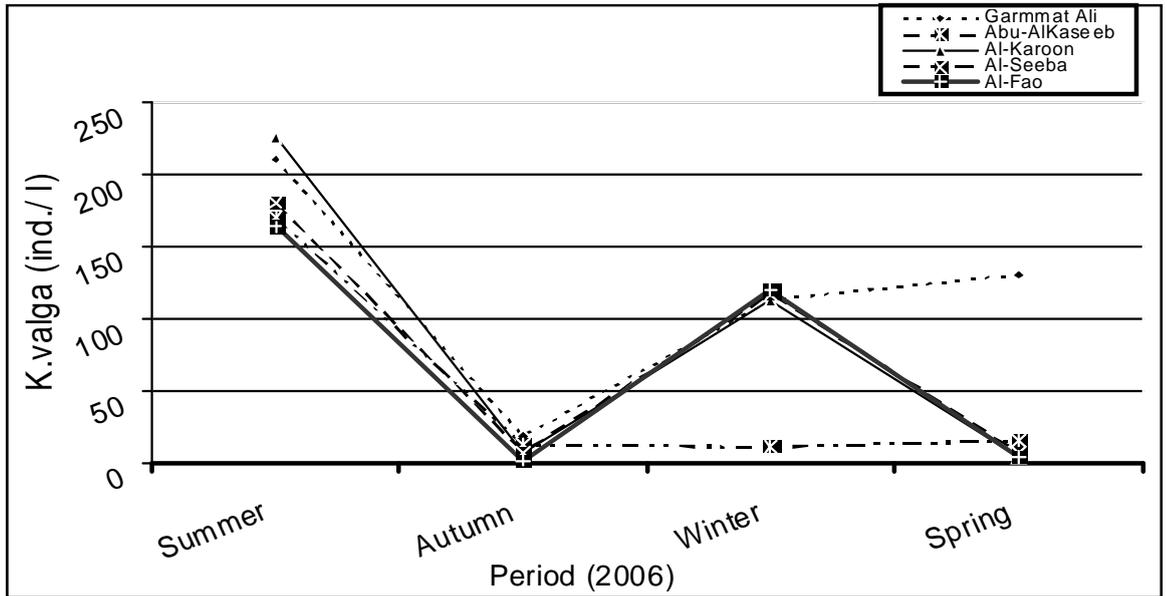


Fig (3) Seasonal density variations of *K. valga* (ind./l) in five stations of Shatt Arab River during the period 2006 .

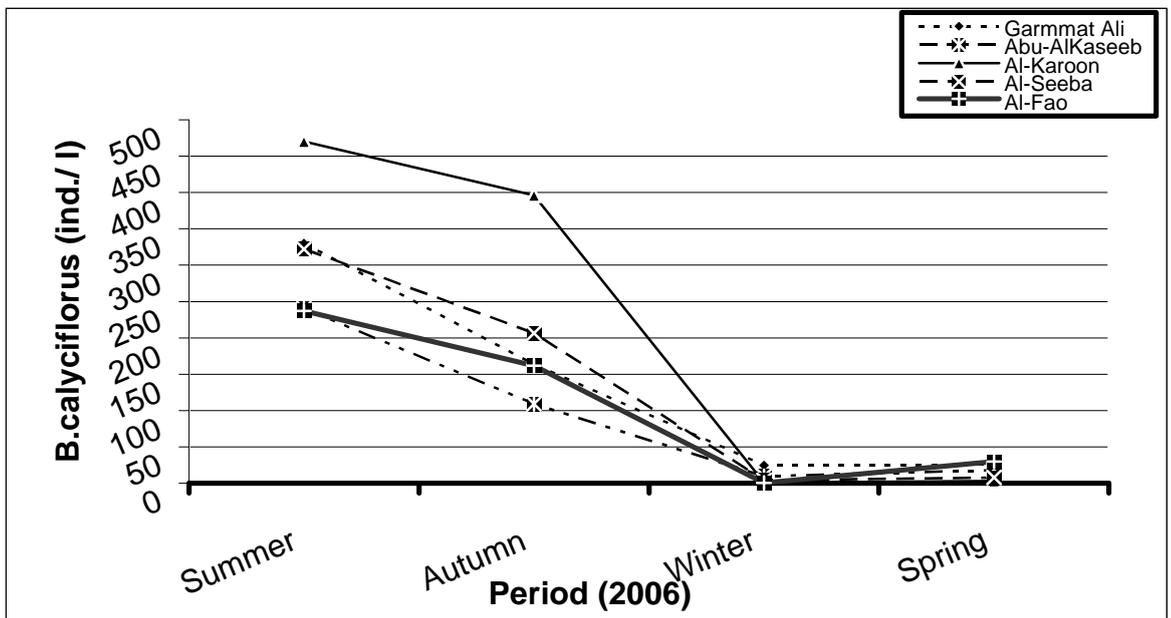


Fig.(4) Seasonal density variations of *B. calyciflorus* (ind./l) in five stations of Shatt Arab River during 2006.

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تركيب تجمع الدولابيات وكثافتها على امتداد نهر شط العرب من كرمة علي إلى الفاو، جنوب العراق

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الخلاصة :-

خضع للدراسة المجتمع الإحيائي للدولابيات في نهر شط العرب ذو المياه المالحة من موقع كرمة علي إلى الفاو جنوباً خلال أربعة فصول من عام 2006 . أعطيت قائمة بالأنواع التي احتوت على 49 نوعاً تعود إلى 27 جنس، الجنس *Brachionus* ضم أعلى عدد من الأنواع (7) <الجنسين *Trichocerca* و *Monostyla* (4) < الجنس *Keratella* (3) . سجل النوعين *Brachionus calyciflorus* و *Keratella valga* الأكثر تكراراً وسيادة في العينات المدروسة. وظهر من بين الخمسة محطات المدروسة تميزت محطة الكارون بأعلى كثافة من الدولابيات (369 فرد / لتر) ومحطة ابو الخصيب كانت الأقل كثافة (230 فرد / لتر). وشهد فصل الصيف اعلى كثافة مقارنة بالفصول الأخرى. حسبت أدله التنوع الإحيائي في المحطات الخمس وتراوحت القيم بين 1.43 - 1.61 لدليل شانون و بين 6.29 - 8.47 لدليل الغنى إما قيم دليل التماثل فتراوحت بين 0.51 - 0.55 .