

A Laboratory Compare of the Growth and Duration Rate of Larva of Protozoa of the Japanese Shrimp (*Penaeus Japonicus*) using Two Kinds of Unicellular Algae (*Chlorella vulgaris* and *Tetraselmis chuii*)

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Abstract:

A study was carried out to evaluate the effect of two kinds of algae (*Chlorella vulgaris* and *Tetraselmis chuii*) on the growth and duration rate of larva of protozoa of the Japanese Shrimp (*Penaeus japonicus*) using different concentrations either separately or as mix. This study showed that the high duration rate (69%) was performed when we use mix of both algae by concentration 70×10^3 (50% of each alga). However, when each of the two algae was used alone, *T. chuii* given duration rate higher than *Ch. vulgaris* with 38 and 28 % respectively. The results showed that the best growth of larva of protozoa was 2.87mm when the mix was used by all used concentrations compare to use them as alone. It was notable that the growth of larva was convergent for the two kinds of alga when they were used as alone with simple difference for *T. chuii*.

Keywords: *Penaeus Japonicus*, *Chlorella*, *Tetraselmis*, Survival, Growth.

I INTRODUCTION

Although there are many kinds of Shrimp that immigrated to Mediterranean through the Red Sea such as *Penaeus*, *Semisulcatus*, *Metapenaeus*, *Monceros*, the kind *P. japonicus* is considered the most prevalent in Syrian regional water of the Eastern Basin of Mediterranean Sea [1]. Culturing process of this kind is still recent and within the experimental stage and doesn't rise to the commercial level yet. While, in Japan the breeding of this kind has begun ten years ago [2]. And since many researches had discussed the ways of improvement ratio of growth and duration of the larva stage by using two types of food: organic food and the feeding one [3].

In general, larva stages are considered the most sensitive in the shrimps life cycle which includes three basic stages that each one of them has many molts. The first stage after egg hatching is the Nauplius, and the next is Protozoa where feeding process begins from this stage which mainly depends on unicellular algae especially the following kinds: *Chlorella vulgaris*, *Chaetoceros gracilis*, *Skeletonema costatum*, *Tetraselmis chuii* and *Isocrysis* [4]. and with suitable dimensions for the larva oral aperture of this age (2- 8) micron. The next stage is Mysis where newly hatched *Artemia* larva is added to the algae [5].

Many studies showed the effect of different kinds of micro algae on the duration ratio and growth of the shrimps larva, and many other studies pointed out that the reason of this effect due to the difference of food composition to these algae [6,7,8]. as well as, the importance of suitable concentration that should be added to the feeding basin is considered, where many studies showed that the low concentrations have a very bad effect on growth and duration rate as like as the high concentration does has the same bad effect [9].

It is worth mentioning that are many other reasons in addition to food that effect on larva growth and duration such as environmental factors as temperature and saltiness [10].

In the present study, the above factors made same and took these reasons consideration and study larva of the female itself with two kinds of unicellular algae either separately or as a mix of these two kinds with different concentration.

II MATERIALS AND METHODS

The study was performed during 2015 in laboratories of department of zoology, Tishreen University. One of the matured females in phase of delayed maturity (V1) were collected from seaboard of Jabla city on depth of 40 m and moved carefully to the studies lab to be put in basin provided with battery pump air. The female was put in plastic hatch out basin with 150L of filled sterile ultraviolet rays filtered sea water under temperature of 29°C with about 5 ppm of dissolved oxygen. An ovulation was at night and eggs were stayed in the same basin till the larva became in stage 4 Nuplius to be moved later to 15 flasks each one filled with 2L in a concentration of

100 larva/ L. Temperature set at 27°C, and salinity at 35‰ and not less than 4 ppm dissolved oxygen. 5 of the flasks were fed with four different concentrations of the algae *C.vulgaris* 30, 40, 50, 60 and 70 ($\times 1000$ cell/ ml, respectively). While the other

five flask have the same previous concentrations with a mixed of the tow previous algae with a rate of 50% of the last concentration for each one, algae were already prepared by using feeding medium f/2 [11]. The samples were taken daily of larva feeding mediums and protozoa larva duration rate was calculated starting from PZ1 till M1 where the total length measures were treated by using ANOVA Analysis.

III RESULTS AND DISCUSSION

The results showed that the highest duration rate of 69 % done when using the mix of the tow kinds of *T.chuii* , *C.vulgaris*, at the concentration 70×10^3 cell/ml (for each one 35×10^3) as it is explained in figure (1). Wherer the duration rate was higher when using *T.chuii* than *C.vulgaris* in case they are used separately by using all concentration.

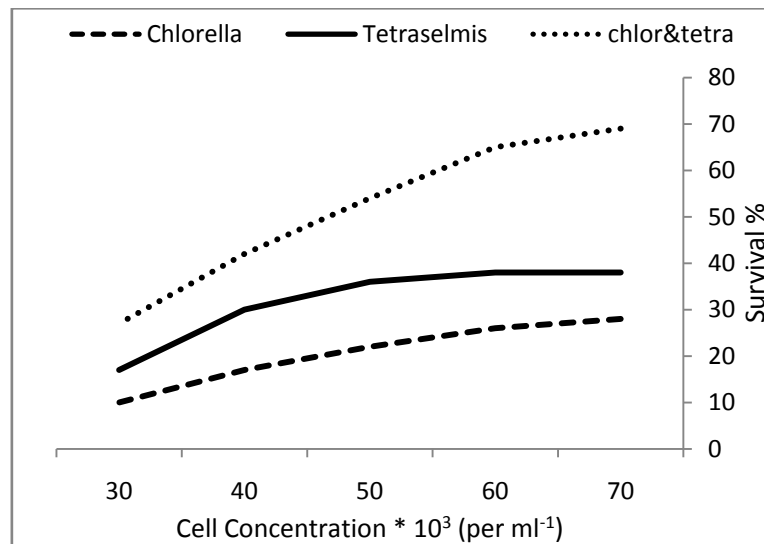


Fig 1: Effect of Use the Two Kinds of Algae Separately and as a Mix On Duration Rate Of Protozo Larva of *Penaeus Japonicas*

The results also showed that the best protozoa larva growth rate was when using a mix of two kinds *C.vulgaris* and *T.chuii* in concentration of 60×10^3 cell/ml and the total length medium was at the end of this stage 2.75-2.85 mm and concentration effect was relatively few as in figure [2]. While in the two algae case separately, the growth rate was clearly

less and where concentration increasing effect was clearer on growth. It was notable that using the mix made a time of larva turning into M1 stage shorten. But this turning time was neglected in this study and measures were taken at the end of the stage regard less of time.

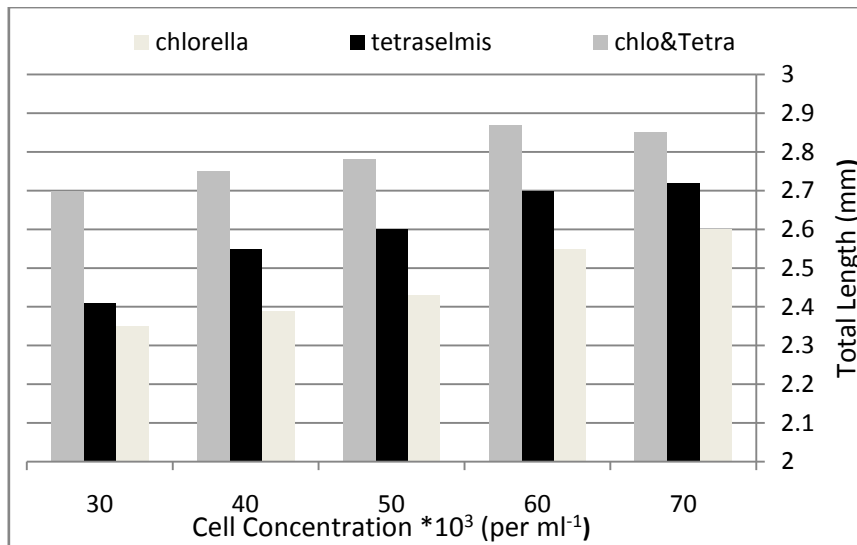


Fig 2: A Mean of Total Length (mm) in the End of PZ3 Stage of *P. japonicus*

Although that a lot of studies considered the kind *T.chuii* is a good food for the different Protozoes larva related to Penaeidae family, there were other studies showed that kinds as *Chaetoceros* is better with regarding to growth and duration rate [7]. And this was due to the difference (fatty acid) between algae kinds, it is also obvious that there are significant differences related to the algae effect that are used on larva related to different kinds of shrimps in turn. However duration rate is not the only measurement unit for algae feeding value where it is possible for algae to give a lower survival rate in comparison with other algae, but, the growth would be better then [12]. For example: *Chlorella* sp gave a higher duration rate but not a better growth one when

using in feeding juveniles stage with *Penaeus monodon* [13].

Where the studies showed a better duration rate than this present study of 96% when using *Thalassiosira weissflogii* in feeding larva PZ1 AND PZ3 of *P. indicus* [14]. Any how this study is to considered a good beginning in developing larva duration rate of *P.japonicus* , since that shrimp feeding program is still in its early steps in Syria, and according from this study recommends with *P. japonicus* larva feeding from stag PZ1 to stag M1 using the mix of *C.volgaris* , *T.chuii* 50 % for each one, with $60 - 70 \times 10^3$ cell/ml concentration, at temperature of 27°C , salinity 35% in order to get a good growth and duration rate .

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